modern machine shop

"CONVEYORIZED ASSEMBLY SUPPLY"
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FEATURES IN BRIEF
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APRIL 1955

More Beef in the Body

OK series 3600
the BLACK ANGUS of face mills



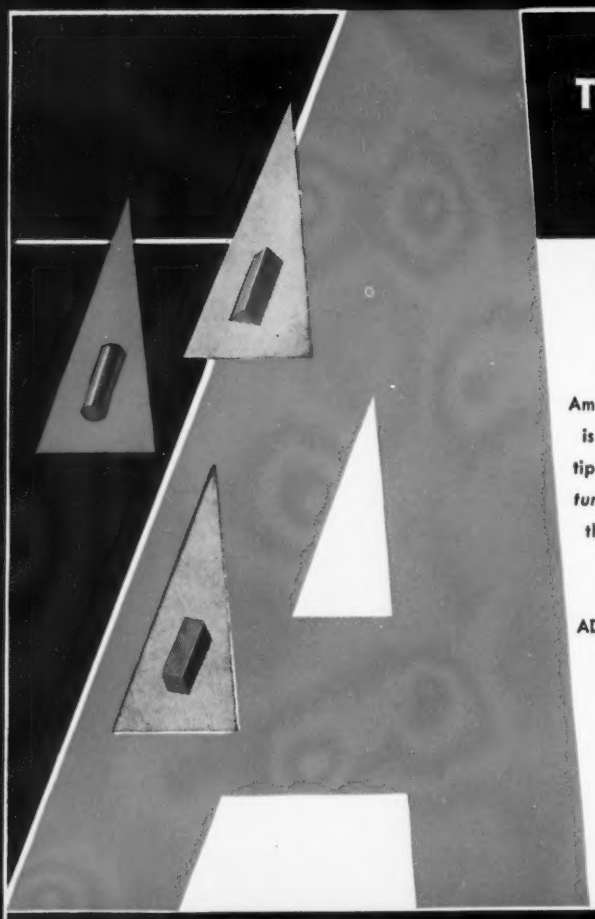
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OK

THE OK TOOL COMPANY, INC.
MILFORD • NEW HAMPSHIRE

modern milling cutters
for modern milling machines



Teeth for the Giant

job-engineered ...and on time

The tremendous power of America's metalworking giants is often focused at the simple tip of a cutting tool. ADAMAS *tungsten carbide* tool tips are the foundation for many of today's best production records. High-quality ADAMAS carbide grades are job engineered to fit both standard and special tool tip, die and wear part applications. Delivery is *fastest in the industry.*

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ADAMAS

TUNGSTEN CARBIDE ®

ADAMAS CARBIDE CORP. • KENILWORTH, NEW JERSEY

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April 1955 Issue

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modern machine shop

431 Main Street
Cincinnati 2, Ohio

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NEW YORK, N. Y.

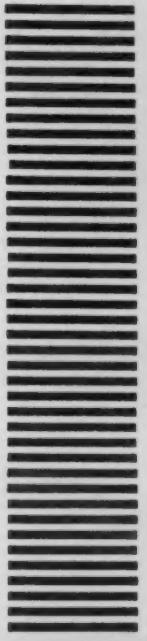
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APRIL
1955
Vol. 27
No. 10

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modern machine shop

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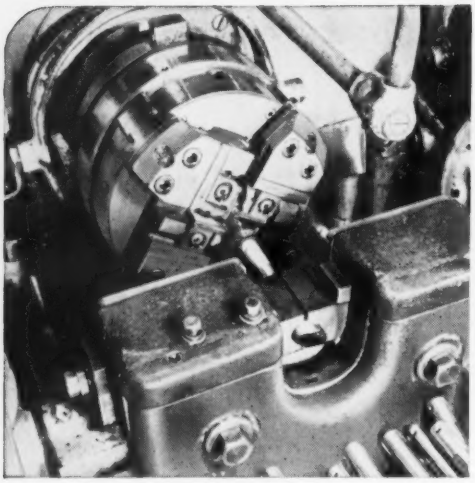
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BOLTS

threaded to ±.001

on a Landmaco Machine

Using LANDIS Threading Equipment, the Chicago Screw Company of Bellwood, Illinois, is able to thread connecting rod bolts to better than Class 4 fit at normal production rates and economicol tool cost.

Bolt blanks are of 8640 steel of 30-36 Rockwell "C" hardness. 11/16" diameter 16 pitch UN form threads must be cut 1-7/16" long over a cotter key hole. Specifications required a ± .001" tolerance on the Pitch Diameter of the thread, and finished threads are closely inspected for concentricity.

To perform this operation a 1½" LANDMACO Double-Spindle Threading Machine equipped with Leadscrew, Hardened and Ground LANCO Heads, and Chasers of special throat length and hardness was installed. In normal production, this LANDMACO Machine regularly completes 127 threaded pieces per hour cutting at 15 surface feet per minute. On an average 400 threads per head are produced between each regrinding of the chasers.

This installation illustrates the production advantages of LANDIS Equipment for difficult and exacting threading operations. The mechanically-controlled positive feed of the Leadscrew, the maximum rigidity of Die Heads designed for precision threading, and Chasers of special specifications—allow threading hard material with minimum cutting strain. As a result, threads are produced to close tolerances at economical production rates and low tool cost.

For further information, ask for Bulletin H-75 (LANDMACO Machines) and F-80 (Hardened and Ground Heads). Please send specifications when writing.

388-MC

LANDIS *Machine* CO. WAYNESBORO PENNA., U.S.A.

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A Jig Borer And Miller For Jobs Up To 30"x48"!



- Fulfills every requirement for accurate boring, drilling and vertical milling of large workpieces up to 5000 Lbs.
- Simplified setup, operation and inspection are possible because many parts are easier clamped on a table than mounted on a horizontal machine.
- All controls are in a single movable panel. Operator can control table and spindle from most convenient location without ever changing his position.
- Infinitely variable spindle speeds and feeds. Non-gear, easily maintained direct drives provide unusual smoothness of operation.
- 35" throat capacity—safety controls for machine, job and operator—unusually heavy construction—and a dozen other exclusive features.

Ask For Brochure

KNIGHT VERSATILE ACCURATE RIGID MILLERS

W. B. KNIGHT MACHINERY CO. • 3922 WEST PINE BLVD. • ST. LOUIS 8, MO.

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YOUR Williams Distributor Supplies a Complete Range of WILLIAMS Tool Holders





Williams Tool Holders are available in a complete range of sizes and patterns for — turning, boring, threading, knurling, planing, cutting-off and side work. A full line of high speed and carbide cutters is available also.

These tools are correctly designed for fast set-up and precise production performance. They are drop-forged from tough quality steel . . . heat-treated for added strength . . . machined to close tolerance finish.

J. H. WILLIAMS & CO. 408 Vulcan St., Buffalo 7, N. Y.

WILLIAMS

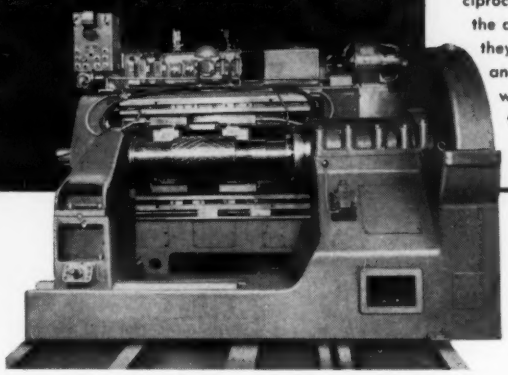
INDUSTRIAL TOOLS

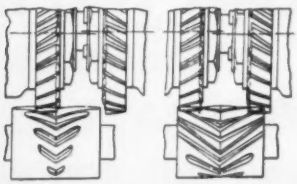
"The Broadest Line of Its Kind"

You'll get SERVICE ON THE DOUBLE from your DISTRIBUTOR'S SALESMAN
He'll give you quickest delivery at lowest cost!

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HOW TO "PRECISION GENERATE" GREATER PROFITS!





PRECISION GENERATION

The Farrel-Sykes gear machine is equipped with two cutters mounted on a single carriage. The cutters reciprocate, each ending its stroke at the center of the blank. As they cut, they rotate to generate the helices and also slowly revolve in unison with the gear blank to generate the tooth contours precisely.

The speed, in operation and set-up, of a Farrel-Sykes "Twin-Head" gear generator, will cut your man and machine hours, and therefore decrease your manufacturing costs. New design features contribute to more efficient operation. Rapid selection of speeds and feeds, easy adjustment of cutters, easy and positive control of infeed, are examples.

And the accuracy inherent in the Farrel-Sykes process of gear generation assures accurate tooth spacing, profile and helix angle. The gears you make will operate smoothly, quietly and efficiently for many years to come.

The "Twin-Head" generator cuts all types of herringbone gears, single helical and spur gears, two members of a cluster gear simultaneously, and other toothed and cylindrical forms.

Ask for bulletin T-455.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Cambridge (Mass.), Akron, Cleveland, Chicago, Los Angeles, Houston

FB-968

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ONLY TWO EASY STEPS . . . Both Amazingly Swift and Efficient FOR FAST PRECISION FINISHING

FULMER HONING MACHINES

1. Honing stones SHEAR off the protuberances from the internal bores . . . then
2. FINISH the internal surfaces to geometric accuracy so rapidly that as much as 1/16 inch is removed from the diameter at a rate of 1½ to 2 cu. inches or more per minute.



Fulmer Honing Machines speed cutting and finishing and insure dimensional accuracy to tolerance of .0001 (±) in every internal honing operation for ferrous and non-ferrous metals, plastics, glass, etc.

Photograph shows Fayscott Corporation of Dexter, Maine, honing spindle sleeves for Giddings & Lewis boring mills.

C. ALLEN FULMER CO.

Write for bulletin on honing

1233 FIRST NATIONAL BANK BLDG. **CINCINNATI 2, OHIO**

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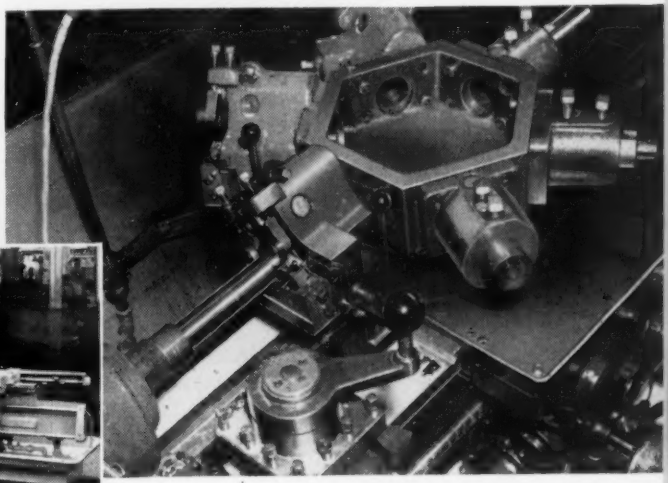


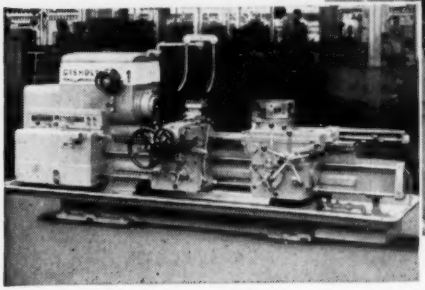
take shaft jobs Like This:

they take less time on

GISHOLT TURRET LATHES

Yes, even in lots as small as 5 or 10 parts, you can't beat turret lathes on this kind of work. Parts are machined complete in 2 operations—total time is less than 4 min.





no extra equipment needed!

With no more than your standard bar equipment, you're all set to cut machining costs on shafts like these. No previous operations . . . such as cutting to length or centering . . . are necessary. And with *two or more tools* from turret and side carriage, you have the basic advantage of turret lathe economy—the time saving that means lower costs.

Before you turn to extra equipment or special attachments, look into the possibilities of doing the job the quick and easy way on Gisholt Turret Lathes. Gisholt engineers will gladly help you.

GISHOLT MACHINE COMPANY
MADISON 10, WISCONSIN

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



TURRET LATHES . AUTOMATIC LATHES
SUPERFINISHERS . BALANCERS
SPECIAL MACHINES

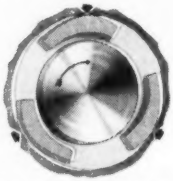
They have what . . . to reduce centerless grinding

Thirty-three years of experience in centerless design and application has gone into the new CINCINNATI FILMATIC No. 2. You will find it more accurate, more versatile than ever before. Time-proved Cincinnati advantages have been retained . . . bed-rock grinding wheel spindle mounting; FILMATIC grinding wheel spindle bearings; double slide construction between bed and regulating wheel housing; simplified method of truing regulating wheel. And now these additional advantages are included . . . infinitely variable regulating wheel speeds; pre-loaded, precision ball bearing lower slide; pressure lubrication of regulating wheel spindle bearings; stabilized infeed screw. ¶ Of course, many more features desired by centerless grinder users are incorporated in the new CINCINNATI FILMATIC No. 2 Centerless Grinder. Would you like to know more about them? Write for new catalog No. G-644.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

CINCINNATI

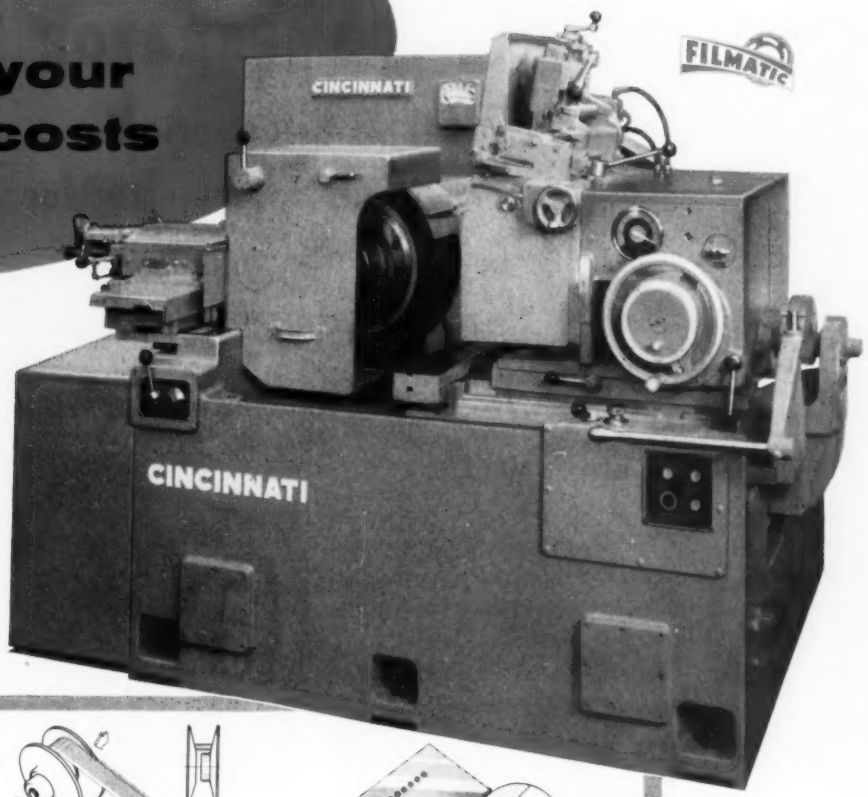
CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

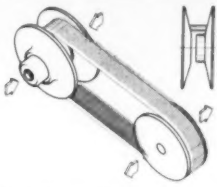


FILMATIC grinding wheel spindle bearings are still the best in the machine tool industry; no fuss, no bother.

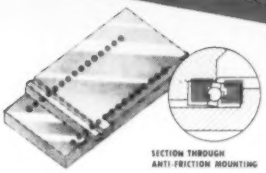
it takes your costs

NEW CINCINNATI FILMATIC No. 2 CENTERLESS GRINDER





Smooth regulating wheel drive through variable pitch sheaves; infinite number of speeds, handwheel selected and tachometer indicated.

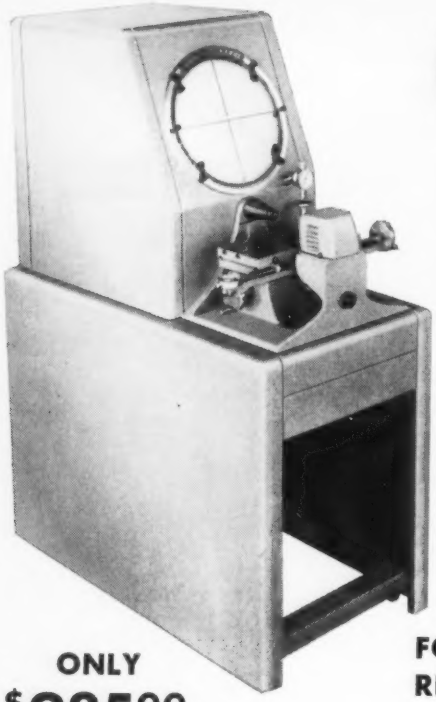


SECTION THROUGH ANTI-FRICTION MOUNTING

Precision anti-friction slide under regulating wheel unit; split-hair dial adjustment is translated precisely to infeed movement.

CINCINNATI

For more data circle **208** on Reader Service Card



COVEL *Optical* COMPARATOR

New, low-priced contour projector for quick, economical precision inspection

FOR ACCURATE CHECKING RIGHT IN THE SHOP

ONLY $985.00

Large work capacity, sturdy, precision construction and optic arrangement which permits use in bright light in the shop. Ideal for shops using mechanical measuring methods because they haven't been able to afford the luxury of an optical comparator.



SEND TODAY FOR DESCRIPTIVE BULLETIN

M-45C

COVEL MANUFACTURING COMPANY

BENTON HARBOR, MICHIGAN

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It's Here—At YOUR Request. The acceptance of the Cri-Dan single point threading method has resulted in a new, heavier machine of extended capacity. Precision threading PLUS secondary turning, boring, facing and chamfering facilities are incorporated. Complete hydraulic and electric controls assure maximum efficiency. These brief specifications will show the ruggedness and range of this, the newest and finest Cri-Dan ever developed. Write The Lees-Bradner Company, Cri-Dan Division for information of the processing of your parts.

SPECIFICATIONS

Threading Range . . . . 2 TPI-48 TPI	Max. Taper of Thds. . 15° Included
Max. Thd. Dia. (Internal) . . 16" Dia.	Multi-Start Threads . . . . . Yes
Max. Thd. Dia. (External) . . 12" Dia.	Spindle Speeds . . . 50-1400 RPM
Max. Swing Over Ways . . 25" Dia.	Main Motor . . . . . 20 H.P.
Max. Swing Over Tool Slide 12" Dia.	Floor Space Req'd . 5'6" x 14'0"
Max. Thread Length . . . . . 6½"	Approx. Weight . . . . . 4½ Tons

Length Between Centers . . . . . 2'6", 5'6" & 8'6"

Cri-Dan Division

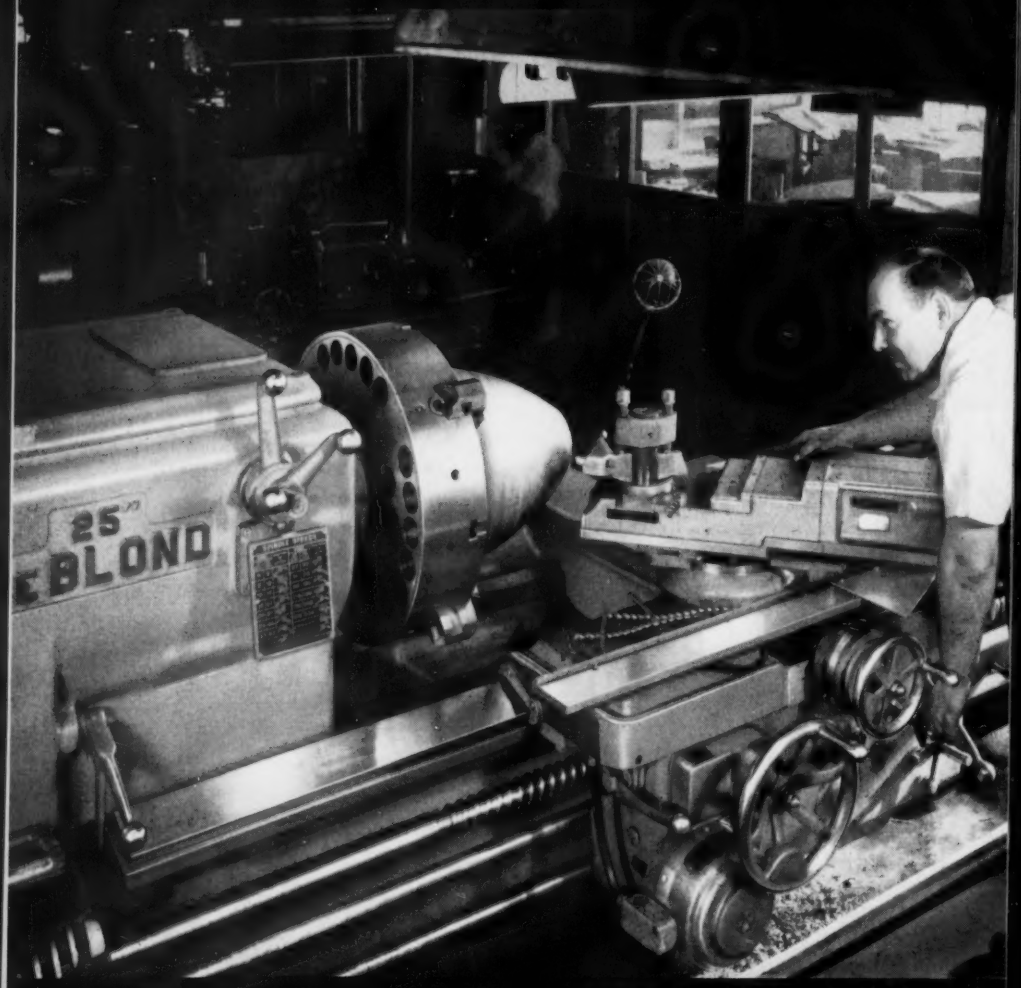
the LEES-BRADNER® Company

CLEVELAND 11, OHIO, U.S.A.

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At United Specialties Co. . . .

Here's Diversified Toolroom Turning—



Turning Spin Blocks (dies) for TV Cones—United uses 24" tool steel blocks to spin their metal TV cones. Large swing capacity in their LeBlond Toolroom lathe allows them to handle these die-turning jobs promptly as they are needed. They get high speed, excellent finish and accurate contours.

from 1000 lb. Spin Blocks to Contoured Stamping Dies

Accomplished with smooth-powered LeBlond 25" Tracing Lathe

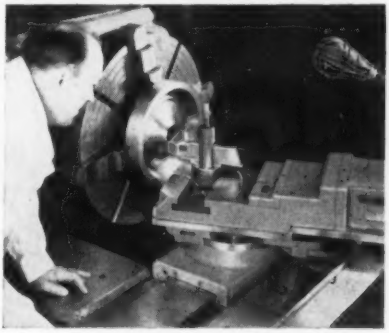
Toolroom jobs at United Specialties Co., Chicago, required a big-swing lathe for pieces like heavy spin-blocks, plus convenience and ease of handling on smaller die jobs—many with difficult contours.

Sales engineers at our Chicago Office recommended a LeBlond 25" Heavy-Duty Lathe with Hydra-Trace. It gave United just what they needed—big-swing, smooth power, a lathe that could tackle virtually any of their die-turning jobs.

Mr. M. J. Perkovich, Toolroom Superintendent for United Specialties, says "Our LeBlond Lathe with Hydra-Trace works at least 75% to 175% faster than previous methods. And it completely removes all 'guesswork' on the part of our operators when shapes and radii are involved."

In the toolroom or on the production line, you can count on LeBlond Heavy-Duties with Hydra-Trace to have plenty of "beef" for heavy hogging, plenty of accuracy for extra-fine finish. And they're ideal for complex contour and angle work. Hydra-Trace attachment is easily and quickly installed or removed. Gives maximum flexibility of adjustment for best working angle.

LeBlond Heavy-Duty features include: 4-direction power rapid traverse built into apron; one-piece double-wall apron, hardened rack; totally-enclosed quick-change box; hardened and ground replaceable steel bed ways; thrust lock tailstock. See your LeBlond Distributor today or write for bulletin *HD 155T-E.*



Turning mating dies for stamped air-cleaner parts—United stamps out complicated ridged and contoured air-cleaner parts, in many sizes and shapes. In each case, mating "re-draw and size" dies are needed. Die shown above, for instance, has 11" O. D. with complex contours and angles, calling for tool "dive-in" on some surfaces. As a result, top cutting speeds cannot be used. United happily found that their LeBlond 25" gives them all the power they need, even at low rpm—with no stalling, no shakes and jitters, no ruined dies or frayed tempers.

Hydra-Trace (Trade Mark, Registered U. S. Pat. Office) is LeBlond's heavy-duty hydraulic tracing attachment. Can be mounted in place of the compound rest on practically all LeBlond Lathes.

. . . . cut with confidence

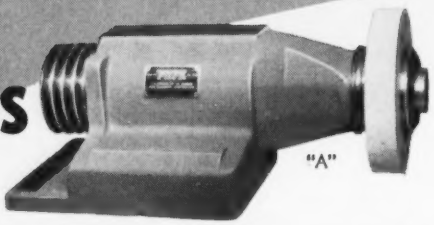
LeBLOND of Cincinnati

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • FOR MORE THAN 67 YEARS.

Specify POPE

HEAVY DUTY WHEEL HEADS



"A"

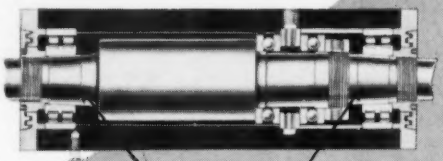


"B"
Power-Max 25 HP—available with standard No. 30, 40, 50 or 60 milling machine noses.

Note the big precision bearings and the big shaft.

A pair of precision thrust bearings stabilize the shaft against any axial movement in either direction. (No end play)

The double row cylindrical roller bearings carry the radial loads with ease and at low temperature.



Taper mounting provides for precise individual preloading of the radial bearings.

Send us your specifications and ask for Catalog No. 59

POPE Heavy Duty Wheel-Head Spindles are designed for a wide variety of applications such as grinding, boring, milling, drilling and many other operations requiring PRECISION COMBINED WITH RUGGEDNESS in the spindles.

For continuous production and trouble-free operation THERE'S NOTHING LIKE A POPE SPINDLE WITH ROLLER BEARINGS.

No. 94

Specify **POPE** PRECISION SPINDLES

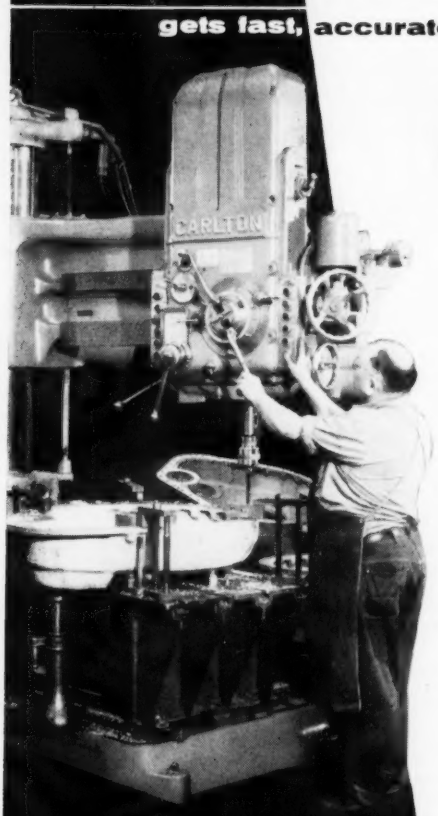
POPE MACHINERY CORPORATION
Established 1920
261 RIVER STREET · HAVERHILL, MASSACHUSETTS

For more data circle **213** on Reader Service Card

Caterpillar

gets fast, accurate, heavy duty drilling with

Carlton
radial drills



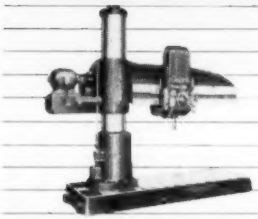
Carlton 3A radial drill at Caterpillar Tractor Co., boring bearing diameters and drilling and tapping holes over 1" in diameter in a cast iron gear housing cover.



Drilling at Caterpillar Tractor Co. is strictly large scale . . . yet it must be fast and accurate. That's why Caterpillar uses Carlton Radial Drills. Carlton has everything you need for today's hole drilling precision and production: pushbutton control, super-precision column clamp, 3-unit power clamping, low hung drive, positive tooth feed clutch and easy, economical maintenance.

You're sure to find your most economical size here, too, because the Carlton line includes arm lengths from 3-ft. to 12-ft., column diameters from 9" to 26".

Check Carlton . . . the *one* radial drill that assures you of maximum hole drilling production, precision performance today and tomorrow, and owner *and* operator satisfaction. Why not write today for the 'hole' story.



The Carlton Machine Tool Co., Cincinnati 25, Ohio.

The Carlton Machine Tool Co. Cincinnati 25, Ohio

Please send us descriptive bulletins on Carlton radial drills in sizes indicated:

Arm	Column
____ft.	____in.
____ft.	____in.
____ft.	____in.

Name_____

Company_____

Street_____

City_____ Zone____ State_____

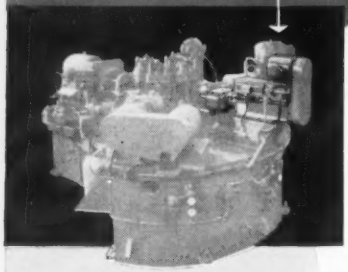
For more data circle **214** on Reader Service Card

New MORRIS AIR·OIL·MATIC DRILL UNITS



air power • hydraulic control or all-hydraulic models

Unit Type Six-Station automatic indexing machine for drilling, tapping and facing a master brake cylinder. The Air-Oil-Matic unit shown drills two .026" diameter holes at 10,000 R.P.M. in cast iron.



perfected to give exceptional versatility for higher production at lowest cost

Here's the automatic drilling unit you've been looking for! The Morris AIR-OIL-MATIC Drill Unit is a powerful package of precise versatility developed and perfected by one of the nation's leading manufacturers of high production drilling machinery. Now, this compact unit (air or oil powered and hydraulically controlled) is available for your use in special purpose machines.

Designed for a wide range of drilling, reaming, chamfering, spot facing, hollow milling, centering and related operations, it can be mounted in vertical, angular or horizontal positions. The Morris AIR-OIL-MATIC Drill Unit has adjustable feed rate, feed stroke, total stroke. Controls and actuating devices can be set to provide almost any desired sequence of operations. (see condensed specifications)

If you have mass production operations involving drilling or related operations . . . you'll want to know all about the Morris AIR-OIL-MATIC Drill Unit. New literature describing the unit, its advantages and applications and complete with specifications, is available on request.

CONDENSED SPECIFICATIONS

Length, width, height	33¼" x 11" x 23"
Maximum HP at 1800 rpm	2 HP
Spindle speeds	133-6900 (Standard) (Special speeds on request)
App. maximum thrust	650 lb.
Maximum drill size	⅛"
Maximum stroke	8"
Maximum feed stroke	4½"
Feed rate range	0 to 48"/min.
Quick approach rate	480"/min.
Quick return rate	300"/min.

Morris MACHINE TOOL COMPANY
934 HARRIET ST., CINCINNATI 3, OHIO

For more data circle 215 on Reader Service Card

New LEAD SCREW TAPPER

Accuracy & Quality Beyond Comparison!



This new lead screw tapper performs with miraculous accuracy . . . maintains uniform precision threads easily . . . all the time! *And* . . . with experienced or inexperienced operators . . . it makes no difference! Here's the secret: the tap is fed gently, easily, automatically without any pressure on the tap itself—it's completely controlled by the lead screw which guides the tap steadily, quickly, accurately—without variation—ever! Tests have shown it to produce parts with 100% inspection—100% acceptable parts—without rejects.

Check these facts on this amazing unit!

- **Consistently produces uniform threads in any pitch from 20 to 80!**
- **Finger tip "trigger arm" travels only 1/4″ on up or down stroke.**
- **Positive depth stop automatically disengages clutch at top and bottom of stroke without overrun; holds uniform depth to within .005″.**
- **Tap capacity 0″ to 1/4″ in soft material — 0″ to 3/16″ in steel.**
- **Entire lead screw assembly can be replaced in seconds for varying pitches.**
- **Lead screw travel 1-3/16″. Will hold a class 3 fit with ease.**
- **Almost all parts spoilage completely eliminated; reduces fixture costs.**
- **Has famed Procunier cork faced friction clutch and exclusive true-grip tap holder.**
- **Can be air operated for greater speed and convenience.**

Write for FREE Brochure giving full details and specifications on this unique tapper. Illustrates the many outstanding features which make it a "must" for industrial users. Write today—now

New "Tru-Grip" Tap Holder is lighter, smaller in diameter. It affords easier tapping close to walls or shoulders, eliminates "chewed" tapshanks.

PROCUNIER Safety Chuck Co.

12- S. Clinton Street • Chicago 6, Illinois

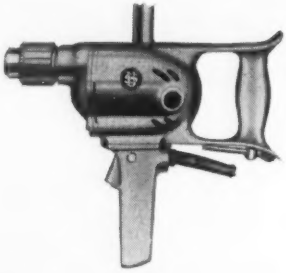
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"THE GOOD MECHANIC'S CHOICE"



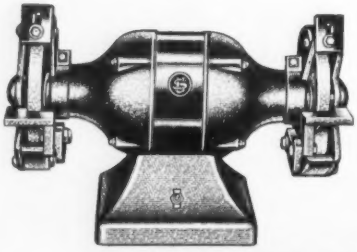
ELECTRICAL DRILLS
Model 14RG Regular
Model 14HD Heavy Duty

Ball bearing throughout; chrome nickel steel gears, heat treated, packed in grease and sealed.



1/2" "COMMANDER" DRILL

The new U. S. Model 1CO2 is an ideal drill for "all-purpose" drilling. This sensational new drill is another U. S. first in the drill field. The compact design, light weight, perfect balance and slow spindle speed are a few of the many features of this tool. It is an ideal drill for driving wood augers and hole saws.



UTILITY BENCH GRINDERS

6" to 10" sizes for grinding edge tools and general purpose grinding. Continuous service. Motors have no commutators, brushes or centrifugal switches.

WRITE FOR CATALOG AND INFORMATION

THE UNITED STATES ELECTRICAL TOOL CO.

CINCINNATI, OHIO, U.S.A.

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For...

General-Purpose Sawing

with

High Speed

Accuracy, Economy



Model 4B/M2/E2
Equipped with standard
work track
(Optional Equipment).

Let us prove to you the many reasons why this MARVEL Hack Saw offers the cheapest, most accurate and fastest "cut-off" method available to you at a low initial cost.

Ask your dealer, or write us for Bulletin GP35 which fully describes and illustrates the many exclusive features which makes this Hack Saw Machine your "best buy".

MARVEL No. 4B

HIGH SPEED HACK SAW

Exclusive features

1. **Horizontal Ball Bearing Saw Frame.**
2. **Screw Feed—Automatic or Hand Driven.**
3. **Quick Return Stroke—allows greater number of strokes per minute.**
4. **Simple Positive Coolant System.**
5. **Adjustable Stroke—can be shortened for larger capacity.**
6. **Speed Range—available in 1, 2 or 4 speed models for wider range of work.**

MARVEL *Metal Cutting* SAWS

Better Machines-Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 Bloomingdale Avenue • CHICAGO 39, ILL.

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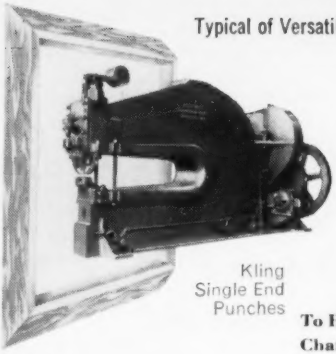
Typical of Versatile Kling Metal Working Machines

PUNCHES TO MEET ALL NEEDS

UNIVERSAL PUNCHES . . . 4 Sizes, 120—150—235—300 tons, 18½ and 28½" throat

SINGLE END PUNCHES . . . 7 sizes, 25 to 760 tons

HORIZONTAL PUNCHES . . . 2 sizes, 55 and 120 tons



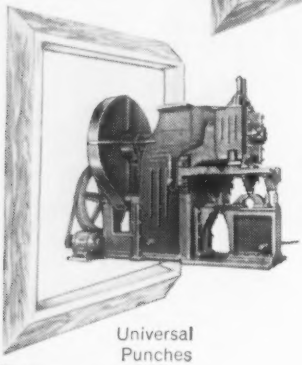
Kling Single End Punches

nearly 50 Different Kling Punches

To Help You Cope With Today's Changing Production Conditions

Yesterday's machines will not meet today's new conditions. Kling, with more than 60 years' experience, is constantly designing, developing and improving new-type, more advanced metal-working machines to meet these new situations.

Write for bulletins



Universal Punches



Kling Combination Shear, Punch and Coper

726 MT

THERE ARE 3 SIZES OF THE KLING COMBINATION TO MEET VARYING PRODUCTION REQUIREMENTS

	PUNCHING CAPACITY
No. 3	11/16" through 1/2" 13/16" through 3/8"
No. 4	13/16" through 3/4" 15/16" through 5/8"
No. 7	1-5/16" through 1" 1-7/16" through 7/8"

In addition to punching, this "jack-of-all-jobs" does a dozen other operations with standard and special attachments.

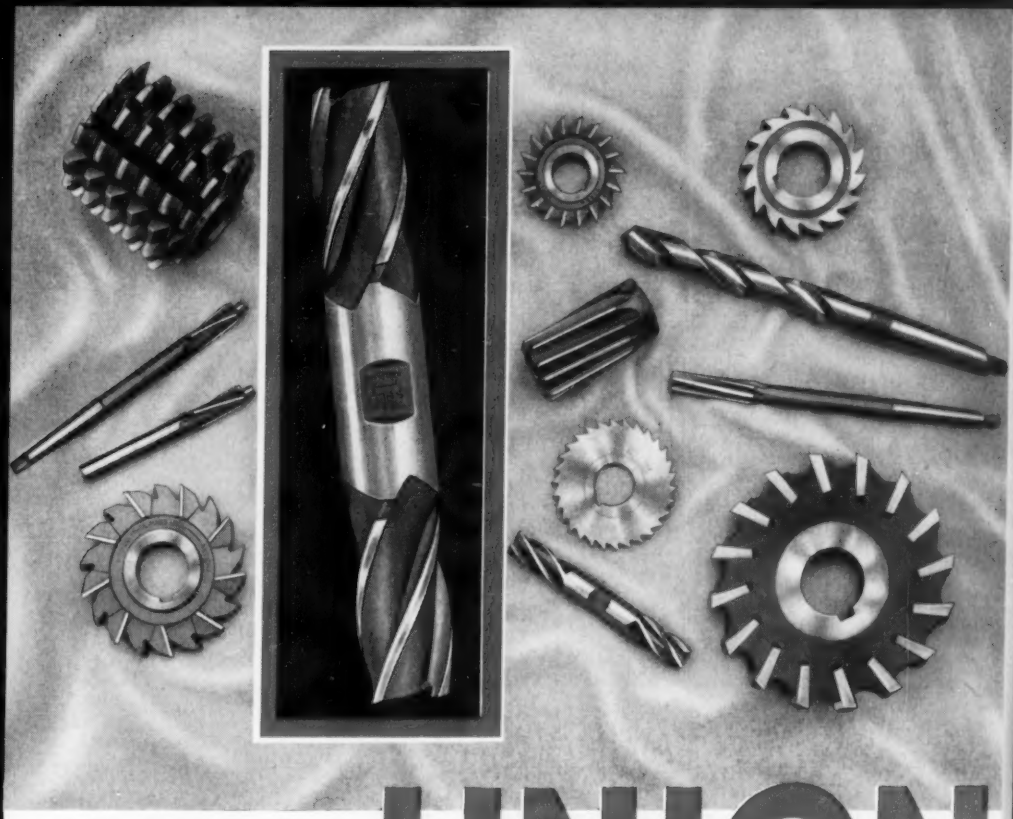
Kling ***. . . an investment in speed!***

MANUFACTURERS OF: Combination Shear, Punch & Copers • Double Angle Shears • Rotary Shears • Punches • Plate Bending Rolls • Angle Bending Rolls • Friction Saws

KLING BROS. ENGINEERING WORKS 1320 N. Kostner Avenue, Chicago 51, Ill

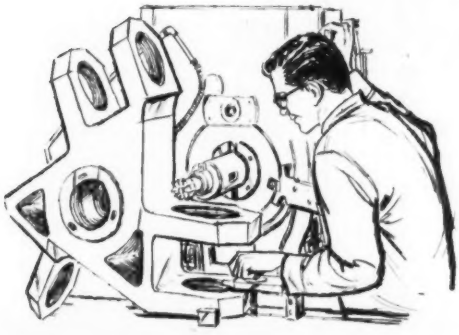
Export Distributor: Simmons Machine Tool Corp., 50 E. 42nd Street, New York 17, N. Y.

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IN THE METAL WORKING INDUSTRY, IT'S

UNION



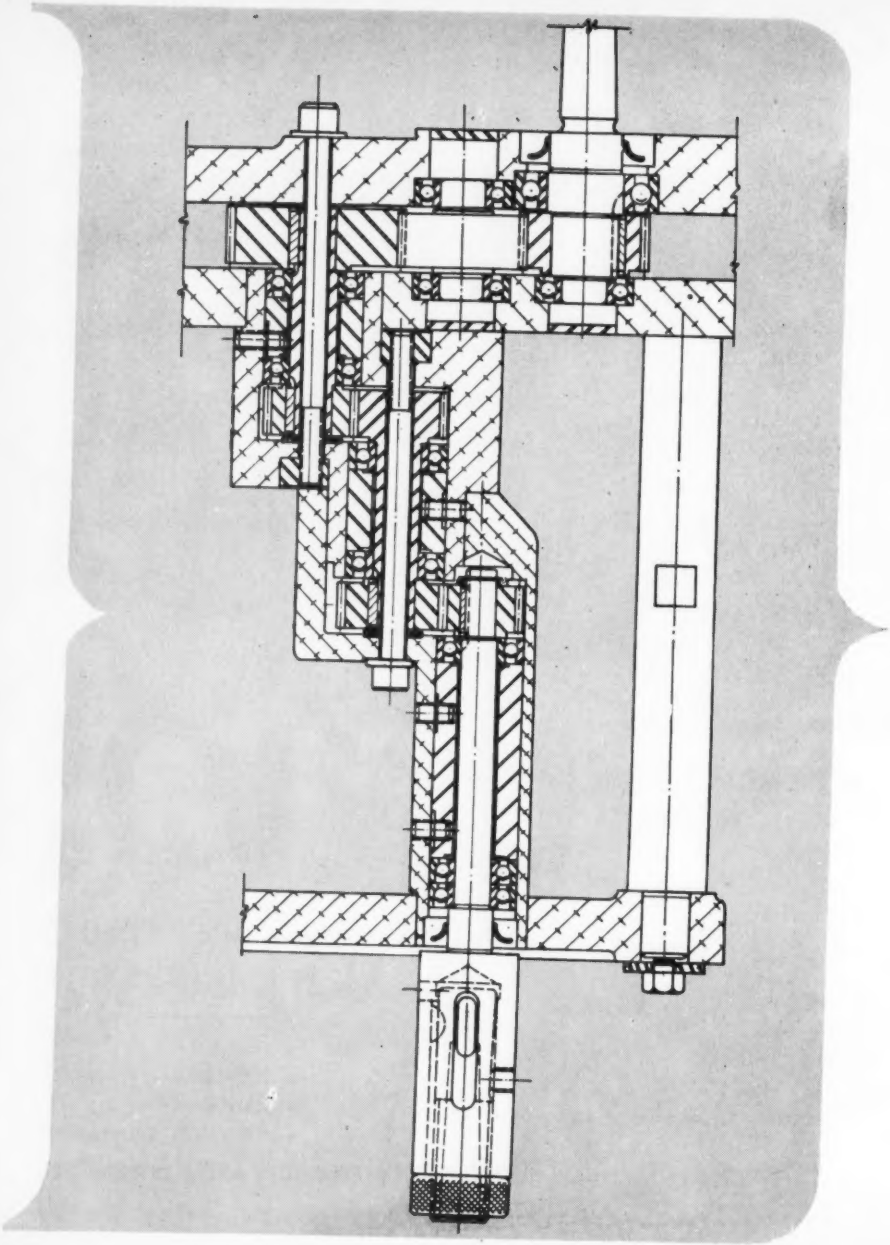
UNION DISTRIBUTORS SERVE THE NATION

FOR
- SPEED
- ECONOMY
- RELIABILITY
- PERSONAL CONTACT

CALL YOUR UNION DISTRIBUTOR

UNION TWIST DRILL COMPANY • ATHOL, MASSACHUSETTS

OWNERS AND OPERATORS OF: S. W. CARD MANUFACTURING CO. DIVISION, Mansfield, Mass.
BUTTERFIELD DIVISION, Derby Line, Vermont and Rock Island, Quebec



ANTI-FRICTION IS NOT ENOUGH!

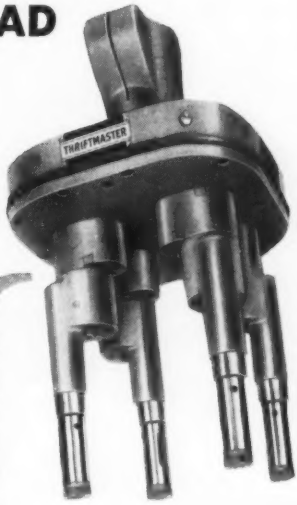
only THRIFTMASTER *has*

Full Ball Bearing Construction

in a DOUBLE ECCENTRIC

ADJUSTABLE DRILLHEAD

- Spindles can be set to drill irregularly spaced holes.
- Pre-loaded ball bearings on *all* rotating parts.
- All essential parts made of fully heat treated Chrome-Moly steel.
- Greater range of adjustment and smaller "dead or blind" area.
- No offset unsupported spindel thrust load.
- For drilling, tapping, boring or reaming.
- 20 standard models—3 to 8 spindles. Special models on order.



WRITE TODAY FOR THE COMPLETE STORY ON THIS DOUBLE ECCENTRIC ADJUSTABLE DRILLHEAD

. . . the latest addition to the Thriftmaster line of single eccentric, universal joint type adjustable and special fixed center drillheads.

THRIFTMASTER

THRIFTMASTER PRODUCTS CORPORATION

Subsidiary of Thomson Industries, Inc.

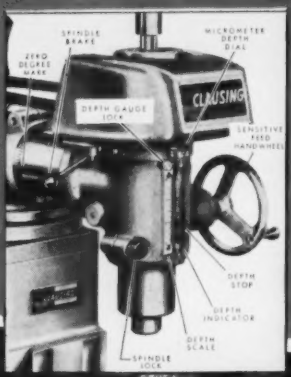
1034 N. PLUM STREET • LANCASTER, PENNA.

Also makers of

DORMAN AUTOMATIC REVERSE TAPPERS

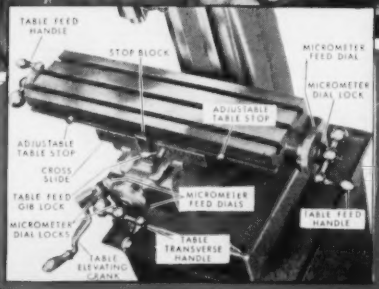
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WHY

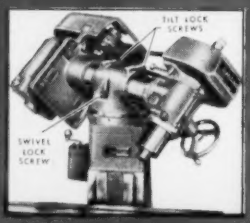


The *Heart* of the Clausing Mill is its rigid, high precision spindle head. It has 7 ball bearings — spindle is chrome nickel steel, hardened and ground — quill, ground and hard chrome plated, has honed bearing seats — overarm is an electric furnace casting, with ¾" thick walls precision ground. The Clausing is a "sensitive" machine you'll appreciate on those difficult jobs.





The CLAUSING Miller table, saddle and knee position smoothly and accurately. Table surfaces and all dovetail ways are precision ground . . . ways have gibs. Feed screws have ground threads, turn on ball bearings.



The spindle head can be swiveled in a vertical plane and set at any angle, and turret rotated in a horizontal plane making it possible to mill at all angles with one setup. Quill has micrometer depth control stop and two feeds, lever and hand wheel.

the new CLAUSING VERTICAL MILLERS are the busiest machines at

The new CLAUSING VERTICAL MILLER is a precision machine tool designed for jig, die and fixture making . . . pattern, experimental and tool-room . . . and general production milling. Many new, exclusive features give it greater versatility and ease of set-up and operation than have ever been available in a miller at or near its price.

And . . . *it is extremely accurate!* Every CLAUSING MILLER must pass rigid tolerance tests — such as:

1. **Top of table perpendicular to column ways, both directions, within .0005" in 8" travel.**
2. **Table top, front to back, square with column ways 0 to .001".**
3. **Table, parallel to turret within .001".**
4. **Spindle square with table, front to rear, within .001" T.I.T. in 5" circle.**
5. **Spindle taper (internal) run out within .0002" at spindle nose.**
6. **Table T-slots parallel to table dovetail ways within .0005" in 8" longitudinal travel.**

You'll be as enthusiastic as P-a-l Engineering with the performance of the new Clausing . . . and you'll be pleased, too, with its low cost and many operating economies. See it today at your CLAUSING dealer's!

MILLS, DRILLS, BORES, REAMS & SHAPES . . . AT ALL ANGLES . . . WITH ONE WORK SETUP!

P-a-l Engineering Std.

September 21, 1954

Atlas Press Company
1915-2023 North Pitcher Street
Kalamazoo, Michigan

Gentlemen:

We have recently purchased our fourth Clausing Vertical Miller and find it measures up to the finest machine standards.

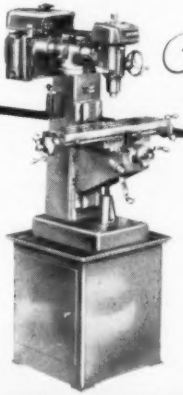
For standard precision, milling, drilling, boring, and location operations within capacity, it has no equal. We find the Clausing Vertical Mill the most versatile machine in our shop, and equal in performance and accuracy to several makes of higher-priced mills of which we have available.

The Clausing Vertical Mills are the busiest machines in our shop due to the variety of operations that can be performed and completed. For speed, convenience, accuracy and higher production at lower cost, it has no equal.

The Clausing Vertical Mill is the preference among our men for all milling machine work in its capacity because it is easier to work on, change set-ups, and it is consistently accurate.

PL/ms

Sincerely yours,
Paul Lebeda
Paul Lebeda



CONDENSED SPECIFICATIONS

Size of Table	6" x 24"
Longitudinal Table Travel	15"
Transverse Table Travel	5"
Vertical Table Travel	11⅝"
Maximum Distance Spindle to Table	11⅝"
Maximum Distance Spindle to Column	8¼"
Quill Travel	3"

Spindle Speeds: Six, 180 to 3250 R.P.M. — No. 7 Brown and Sharpe or No. 2 Morse Taper, Spindle Optional — Operates from ½ or ¾ HP, 1725 R.P.M. Motor.

WRITE FOR ILLUSTRATED LITERATURE TODAY!

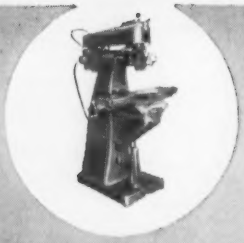
QUALITY MACHINE TOOLS SINCE 1911

CLAUSING DIVISION Atlas Press Company

4-110 N. PITCHER ST., KALAMAZOO, MICHIGAN

CLAUSING HEAVY-DUTY PRECISION LATHES, HEAVY-DUTY DRILL PRESSES

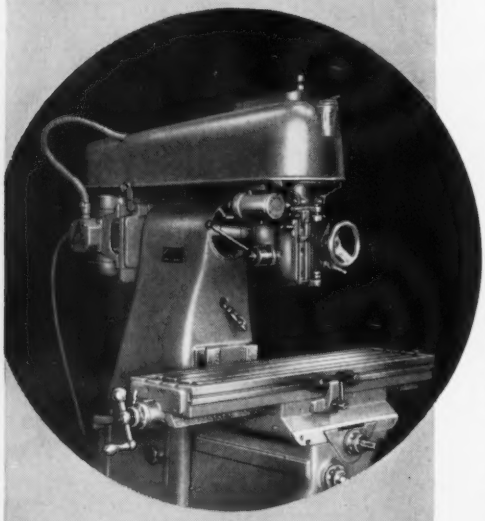
Atlas CLAUSING — PRECISION MACHINE TOOLS — DIVISION ATLAS PRESS COMPANY KALAMAZOO, MICHIGAN U.S.A.



does MORE *work...*
MORE *easily*

new POWER FEED HEAD

U. S. Vertical Miller



Here's the new U. S. Vertical Miller with Power Feed Head—the head into which U. S. has built all the most wanted features without sacrificing traditional U. S. simplicity. Check its infinitely variable feed rate, its 800 pounds of down thrust on the quill, its supplemental hand feeds — it is the milling head that was designed to meet all shop needs.

Add to these the basic advantages of the U. S. Vertical Miller. You can easily see why it's the milling machine that "does more work more easily."

Detailed literature on request. The U. S. Burke Machine Tool Division, 3 Brotherton Road, Cincinnati 27, Ohio.

more versatile
Feed infinitely variable from .002" to .008" while in operation

greater capacity
5½" power quill travel; 800 lb. down thrust

more convenient
Supplemental hand feeds

increased rigidity
Enclosed hard chrome plated quill with internal lock

Write for descriptive folder

THE U·S·Burke MACHINE TOOL DIVISION

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Speed MULTIPLE CUTS

on vertical boring mills with Davis 8-Position *Indexing* Tool Holder



1 HOLDER SETUP

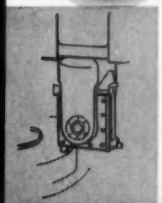
4 TOOLS MOUNTED

8 INDEXED POSITIONS

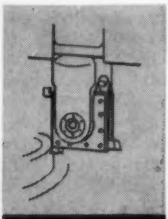


MODEL A
Length 21", weight 105 pounds

MODEL B
Length 24⅝", weight 210 pounds



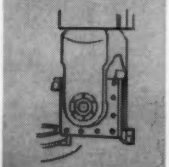
Holder with facing tool presented to work.



Holder indexed 90° to present turning tool.



Holder indexed at 45° for chamfering.



Tool holder indexed at 90° for undercutting.

PRODUCTIVITY of your vertical boring mill—regardless of make or model—can be profitably increased with this new cost-cutting accessory.

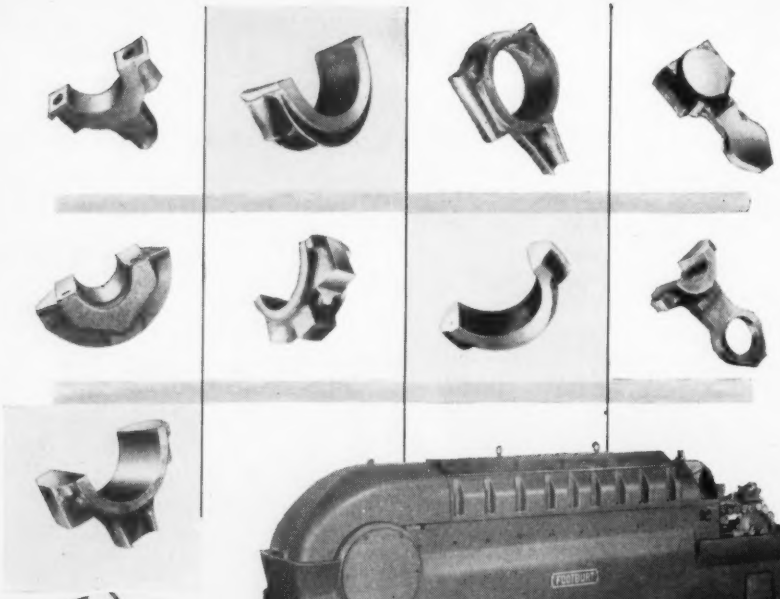
Held in the machine ram head, the Davis Indexing Tool Holder mounts four square-shank cutter bits for successive operations without relocating the work. Also, it presents each tool either square with the work or inclined at a 45° angle, making it useful for a broad range of cuts. Indexing between operations is completed in a matter of seconds, sharply reducing floor-to-floor time. And substantial savings in machining time on multiple operations quickly repay cost of tool holder. Get complete information—learn how your vertical boring mill work can be made more profitable.

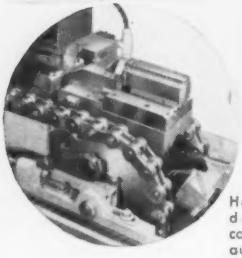
PROFIT-BUILDING ADVANTAGES

- ★ Accurately indexes to 8 positions in 45° steps—instant setting.
- ★ Supplied for right or left-hand ram heads of any vertical boring mill.
- ★ Completes 4 operations without changing tools or relocating work.
- ★ Bores, turns, faces, chamfers, and undercuts.

DAVIS
BORING TOOL DIVISION OF
Giddings & Lewis Machine Tool Company
Fond du Lac, Wisconsin

THE ONE NAME THAT CERTIFIES ULTIMATE PRECISION AND PRODUCTIVITY IN TOOLING





Holding Fixtures are designed for quick, convenient loading, with automatic clamping, unclamping and unloading.

Continuous Type Broaching Machine Built in Five Sizes

machining connecting rods and caps an opportunity for

Surface Broaching

■ Surface Broaching is a modern machining method that in many cases shows reduced costs through higher production, finish to closer tolerance, and low tool maintenance costs. If you machine large quantities of duplicate parts we will be glad to work with you on the possibility of adopting Footburt Surface Broaching Machines. Send us blueprints and hourly production requirements for our recommendations.

THE FOOTE-BURT COMPANY
Cleveland 8, Ohio
Detroit Office: General Motors Building

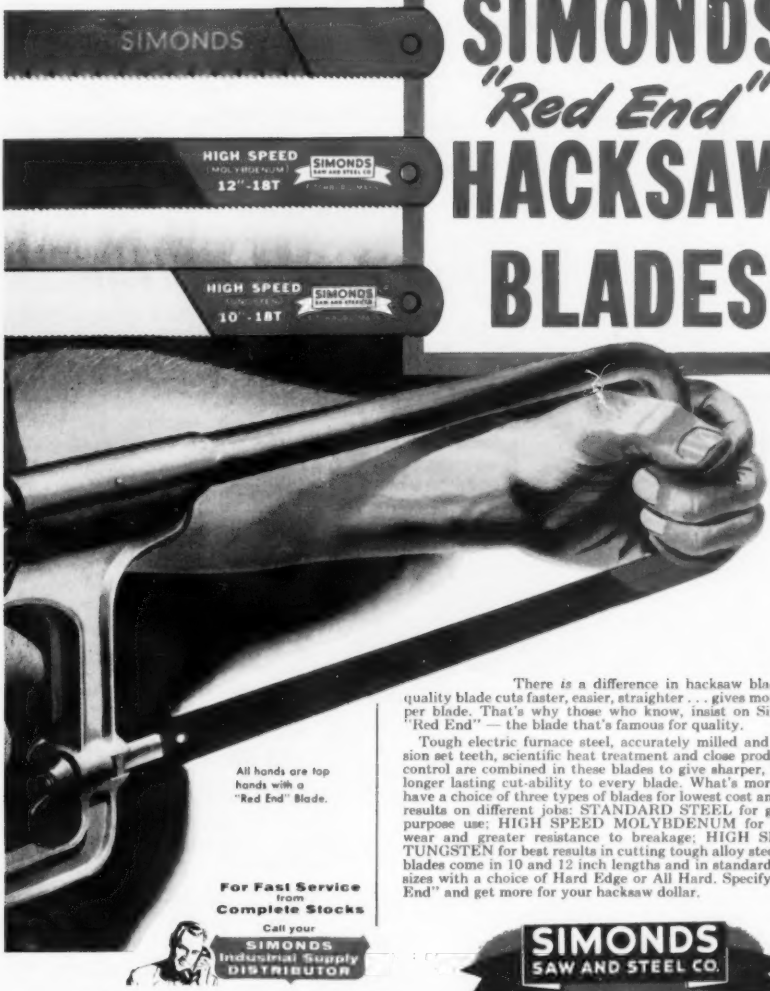
FOOTBURT

PIONEERS IN SURFACE BROACHING

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For Quick and Easy Cutting

SIMONDS "Red End" HACKSAW BLADES



All hands are top hands with a "Red End" Blade.

There *is* a difference in hacksaw blades. A quality blade cuts faster, easier, straighter . . . gives more cuts per blade. That's why those who know, insist on Simonds "Red End" — the blade that's famous for quality.

Tough electric furnace steel, accurately milled and precision set teeth, scientific heat treatment and close production control are combined in these blades to give sharper, faster, longer lasting cut-ability to every blade. What's more, you have a choice of three types of blades for lowest cost and best results on different jobs: STANDARD STEEL for general purpose use; HIGH SPEED MOLYBDENUM for longer wear and greater resistance to breakage; HIGH SPEED TUNGSTEN for best results in cutting tough alloy steels. All blades come in 10 and 12 inch lengths and in standard tooth sizes with a choice of Hard Edge or All Hard. Specify "Red End" and get more for your hacksaw dollar.

For Fast Service from Complete Stocks

Call your

SIMONDS Industrial Supply DISTRIBUTOR

SIMONDS SAW AND STEEL CO.

FITCHBURG, MASS.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon
Canadian Factory in Montreal, Que. Simonds Divisions: Simonds Steel Mill, Lockport, N. Y. Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

For more data circle **228** on Reader Service Card

FOR HOB THREADING:

- NON FERROUS METALS

...YOU NEED ***HIGH SPEED!***

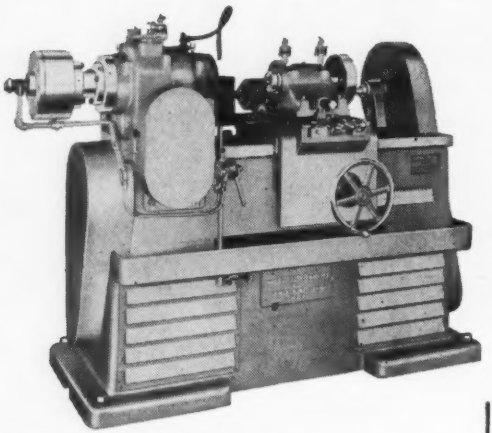
- HEAT TREATED MATERIALS

...YOU NEED ***LOW SPEED!***

- VERY SHORT RUNS

...YOU NEED ***QUICK CHANGEOVERS!***

ONLY THE COULTER "H1" GIVES *ALL THREE!*



Yes sir, the COULTER "H1" Hob Thread Milling Machine is the only completely automatic machine that has such outstanding exclusive features for producing precision internal and external right-hand and left-hand threads — *ON A PRODUCTION BASIS!*

In addition, it's (a) fully AUTOMATIC, (b) works equally well with universal or air operated chucks, or, special fixtures, (c) has work spindle with an extra large hole, (d) work can be inserted from face to rear end, (e) has pick-off gears and adjustable sheave drive.

It's the machine for you!

EXTRA *For Brass, Aluminum and Steel.*
The "H1" makes provision for a separate motor to give the cutter and work spindle a larger range of speeds and feeds for threading these materials.

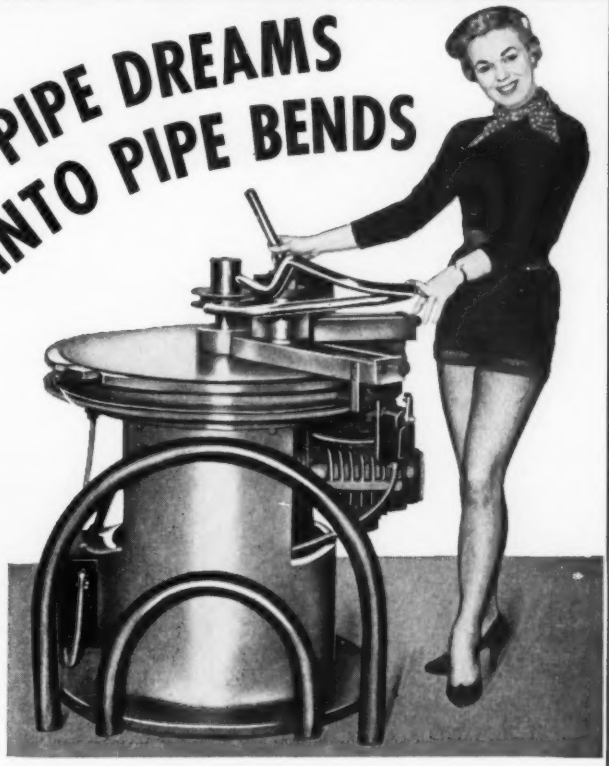
Machine Tool BUILDERS Since 1896

Send for complete information on the "H1" and other Coulter Automatic Threading Machines — no obligation.

The *James Coulter Machine Co.*
641 Railroad Ave. Bridgeport 5, Conn.

For more data circle **229** on Reader Service Card

TURN PIPE DREAMS INTO PIPE BENDS



Prices start as low as $1575.00

•

(Motor and all Electrical Equipment included)

Pipe, tube and structural bending is now simplified with a PEDRICK PRODUCTION BENDER. Heretofore difficult bends, such as offsets and off-plane bends, can now be made in production quantities at an amazingly low cost. ALL PEDRICK PRODUCTION BENDERS are complete with motor, and are equipped with automatic duplicate bending relays.

Write for Descriptive Folder. Dept. 5.

PEDRICK TOOL & MACHINE CO.

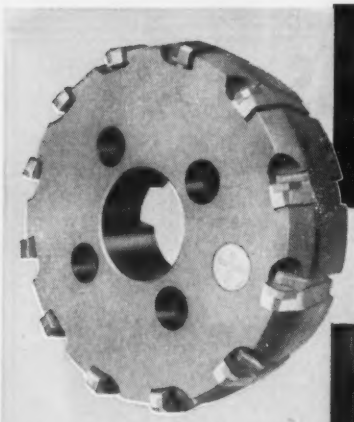
3640 N. LAWRENCE ST., PHILADELPHIA 40, PA., U.S.A.

For more data circle **230** on Reader Service Card

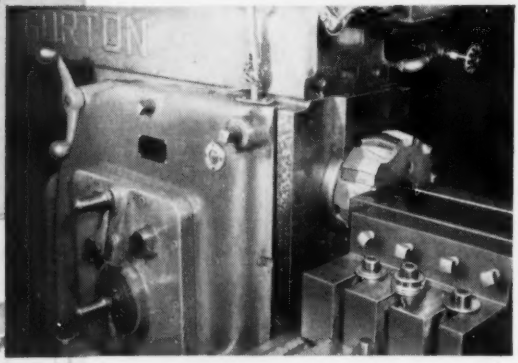
KROSLOK® MILLING CUTTERS

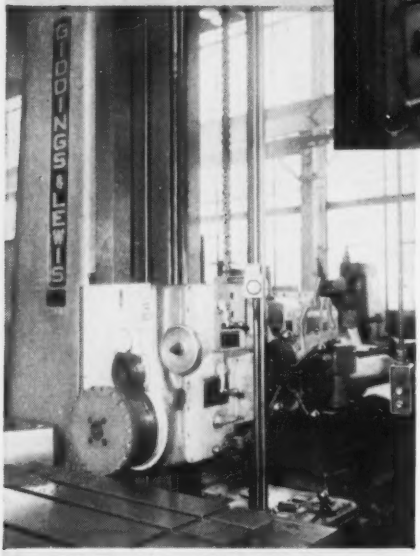
GROUP IMPORTANT CONCEPTS FOR *Higher Production*

TOP FEEDS AND SPEEDS — RUGGED RIGID — ONLY 3 MEMBERS



Where heavy cuts are the rule, Kroslok performs long and profitably.





Production milling requires "tops" in production tools.

Production milling realizes a new high with Kroslok face milling cutters and shell end mills. Simplicity of design (only three members), extreme ruggedness and rigidity, merit your thorough investigation. Kroslok is available in general purpose and heavy duty types for ferrous or non-ferrous metals, with both fine tooth and extra fine tooth variations, in diameters from 3" through 24". May we suit Kroslok's advantages to your job?

THE MOTCH & MERRYWEATHER MACHINERY CO.

CUTTING TOOL MANUFACTURING DIVISION
CLEVELAND 17, OHIO
Stocking Dealers in All Industrial Centers

TRIPLE-CHIP CIRCULAR SEGMENTAL AND SOLID CUT-OFF BLADES • TRIPLE-CHIP SLITTING SAWS • TRIPLE C GRINDING COOLANT • TRIPLE-CHIP SOLUBLE OIL

For more data circle **231** on Reader Service Card



- 9" column; 3' or 4' arm
- spindle speed ratio of 40-to-1
- 12 speeds (up to 3200 rpm) through direct-reading dial
- automatic tapping reverse
- adjustable spring counterbalance (feel remains the same from lightest to heaviest tools)
- hardened tang slot
- safety elevating nut and screw (arm can't drop or overrun)
- rigid, accurate spindle mounted on 5 precision ball bearings

This *completely new* light duty 3 HP radial gives you more advances for your money than any machine of equal capacity, at a price that makes replacement easy and attractive. At the left are some of the features that put you ahead when you own this Gilbert. Your replacement dollar is worth more when you buy a Gilbert. Write for Bulletin Number 255.

The Cincinnati Gilbert Machine Tool Co., 3366 Beekman St., Cincinnati 23, Ohio

those who buy Gilbert buy **GILBERT** *again*

For more data circle **232** on Reader Service Card

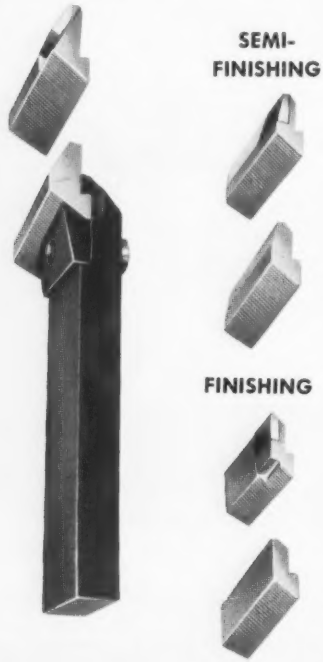
Save! RAPIDOR TURNING TOOLS *feature* INTERCHANGEABLE BLADES

ONLY ONE TOOL NEEDED

ROUGHING

SEMI-FINISHING

FINISHING



Here are ways Bokum can help you save on turning tool investments:

1. Long tool life; blades only need be replaced.
2. 1 holder for three different lathe operations; high speed steel and carbide-tipped blades available.
3. Cutting, clearance angles are built into the cutter; there's constant clearance throughout life of tool.
4. Shape of cross section remains constant.
5. Resharpen top face only.
6. No set-up problems.
7. Rigid, large chip removal—cool cutting action.
8. For roughing, semi-finishing and finishing; for cutting off and threading.

Write Dept. B for Catalog 454.

PATENTS PENDING

4405



BOKUM TOOL CO. 14775 Wildemere Ave., Detroit 38, Mich.

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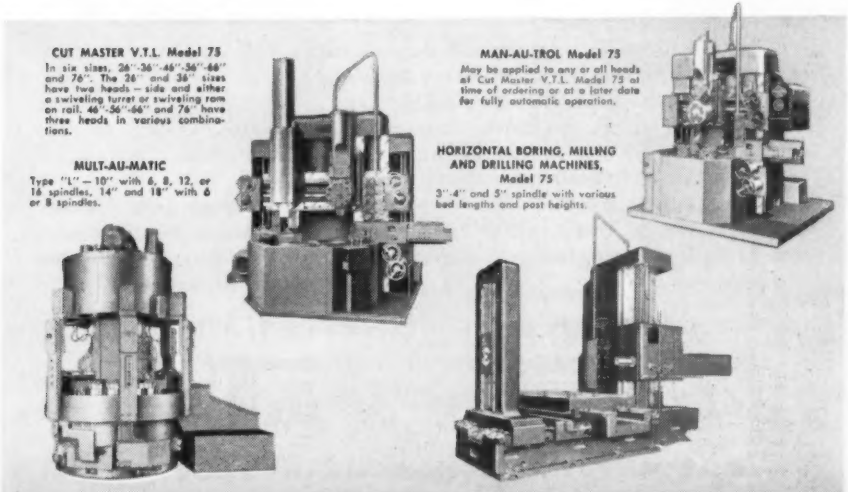
FOR 75 YEARS

Manufacturers of modern machine tools

SEVENTY FIFTH ANNIVERSARY

1880 BULLARD 1955

For three-quarters of a century it has been our privilege to serve industry — at home and abroad — with modern machine tools. Today, as in 1880, the name "Bullard" stands for advance design in engineering, quality of craftsmanship and reliable performance.



THE BULLARD COMPANY • BRIDGEPORT 2, CONN.

For more data circle **234** on Reader Service Card



NOT JUST BETTER- BUT MUCH BETTER!

Test the Dimensionair by the most rigid methods and you will see beyond all doubt that it has unparalleled accuracy and that it has many advantages beyond your expectations.

Just setting it ready to gage is strikingly simple and fast — *less than ten seconds* — absolutely no fiddling around balancing air pressures.

It is the only dimensional air gage *made to a definite predetermined accuracy.* All critical dimensions are made precisely to specified tolerances to assure that accuracy. Every gage repeats the same measurements. It is the *only air gage accurate enough to have a calibrated scale when set to one master.* Its calibration is *not* left to the operator's adjustments but is built into the gage.

If you use old style air gages and are unfamiliar with the Dimensionair, you'll really appreciate its accuracy and ease of handling. Its eleven advantages positively justify the time you take to find out that these claims are *not* exaggerated. In quick, simple set up, speed of setting, gaging accuracy, stability and simple maintenance, the Dimensionair more than justifies its place in your production.

Don't take our word for it — *or anybody's* — take your own. Try it, buy it and use it. You'll insist that the next gage will be a Dimensionair, too. Just ask us for a chance to operate one.

Federal Products Corporation
5144 Eddy Street • Providence 1, R. I.

Ask **FEDERAL**

FOR ANYTHING IN MODERN GAGES...

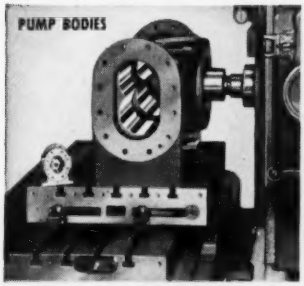
Dial Indicating, Air, Electric, or electronic — for inspecting, measuring, sorting, or automatically controlling dimensions on machines.

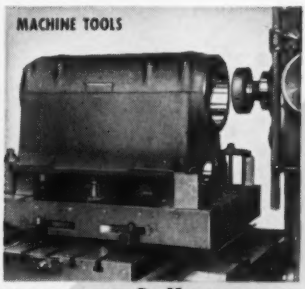
For more data circle **235** on Reader Service Card

The De Vlieg System of

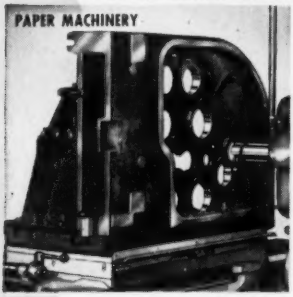
*JIGLESS PRODUCTION

...eliminates expensive boring jigs!



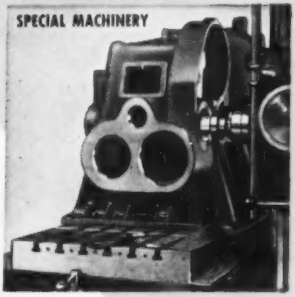


TYPICAL EXAMPLES OF JIGLESS PRODUCTION ON DE VLIEG JIGMILS



The JIGMIL Technique:

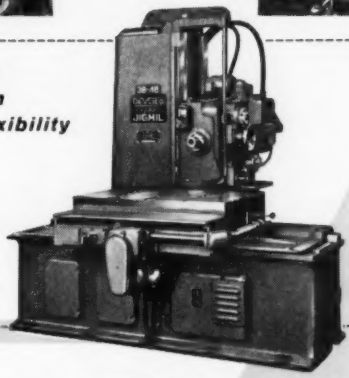
- ELIMINATES SPECIAL BORING JIGS
- REDUCES MACHINING TIMES
- PERMITS USE OF SIMPLIFIED TOOLING
- IMPROVES ACCURACY WITH RESULTANT CUT IN ASSEMBLY COSTS



The De Vlieg System of Jigless Production permits complete flexibility of product design!

If your shop is burdened with costly boring jigs and special tooling, it will pay you to investigate the

DE VLIEG *SPIRAMATIC* JIGMIL



**Come to Detroit—*

see a practical demonstration of the JIGMIL TECHNIQUE

Write for comprehensive illustrated Catalog

DE VLIEG MACHINE COMPANY • 450 Fair Ave., Ferndale • Detroit 20, Mich.

For more data circle **236** on Reader Service Card



DOW

big news in tooling plate is DOW MAGNESIUM!

It's light in weight, the price is low, machinability is unsurpassed . . . magnesium opens a new door to low cost tooling for you

Dow's new magnesium tooling plate is now available from Dow distributors across the country. This is the lightest tooling plate ever made—a full third lighter than aluminum and one-fourth the weight of steel. Yet you'll find its price lower than other commonly used tooling materials.

Dow magnesium tooling plate is rolled —not cast—providing larger sizes, freedom from porosity, better toughness, and a smooth mill surface. Thermal flattening assures positive dimensional stability and excellent flatness. Easiest of all metals to machine, magnesium permits speed and economy unequalled by other metals.

Extra rigidity, good weldability and high strength-to-weight ratio, too, make magnesium plate ideal for jig, fixture and tooling uses. Call your Dow magnesium distributor, today, for price and delivery data or write THE DOW CHEMICAL COMPANY, Midland, Michigan.

DISTRIBUTORS: FULLERTON STEEL AND WIRE COMPANY, Chicago, Ill. • HUBBELL METALS INC., St. Louis, Mo. • A. R. PURDY CO., INC., Lyndhurst, N. J. • RELIANCE STEEL COMPANY, Los Angeles, Cal.

Visit the Dow Booth, No. 809, at A.S.T.E. Convention March 14-18 in Los Angeles

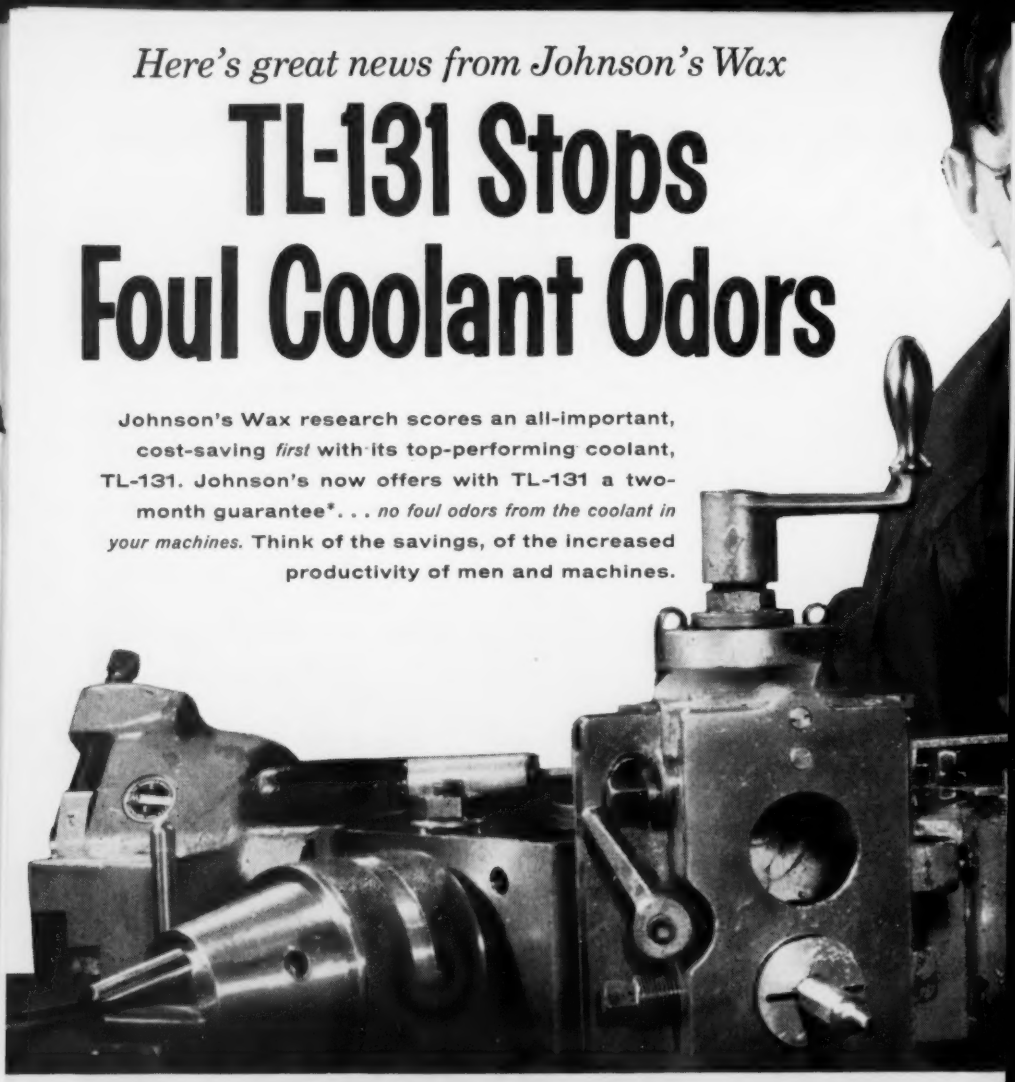
you can depend on DOW MAGNESIUM DOW

For more data circle **238** on Reader Service Card

Here's great news from Johnson's Wax

TL-131 Stops Foul Coolant Odors

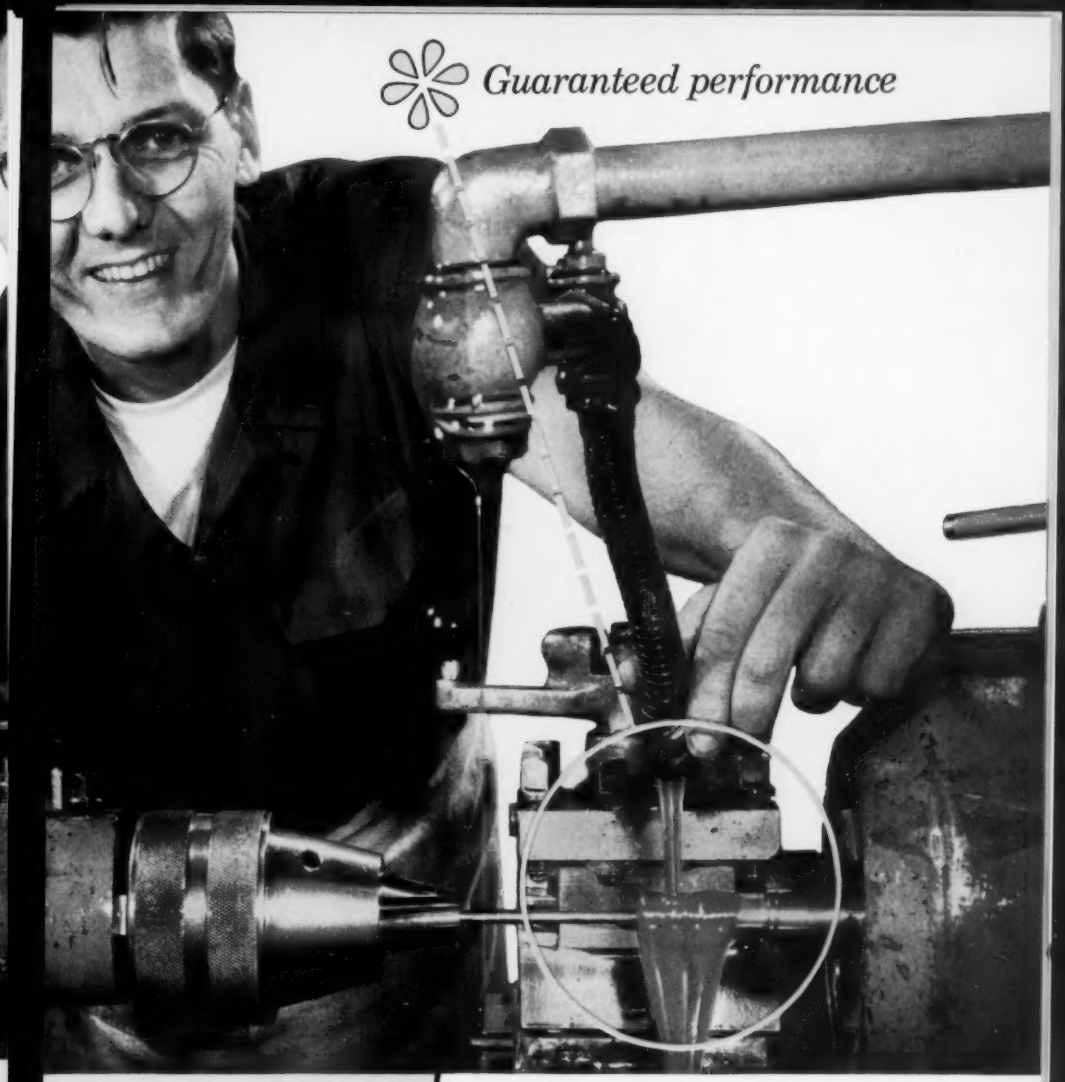
Johnson's Wax research scores an all-important, cost-saving *first* with its top-performing coolant, TL-131. Johnson's now offers with TL-131 a two-month guarantee*. . . *no foul odors from the coolant in your machines.* Think of the savings, of the increased productivity of men and machines.



Your money back if **TL-131** causes odors

Now Johnson's Wax announces that TL-131 is guaranteed to solve the problem of offensive coolant odors in hot, humid weather. Simply clean your coolant systems thoroughly, charge with fresh, clean TL-131 (diluted economically 40 to 1 with water) and we *guarantee* TL-131 will work efficiently for two full months without producing foul odors.

In addition, TL-131 consistently outperforms ordinary coolants to provide increased tool life and greater production. Remember, TL-131 is the coolant that reduces work heat by 400°F. See your local distributor for an in-the-shop test. Mail the coupon for full information.



Mail this coupon for FREE informative booklet on how to end foul coolant odors with TL-131.

A PRODUCT OF JOHNSON'S WAX

S. C. JOHNSON & SON, INC.

Industrial Products Division

Dept. MMX, Racine, Wisconsin

Please send me your informative booklet on TL-131 Coolant.

Name_____

Firm Name_____

Address_____

City_____ Zone_____ State_____

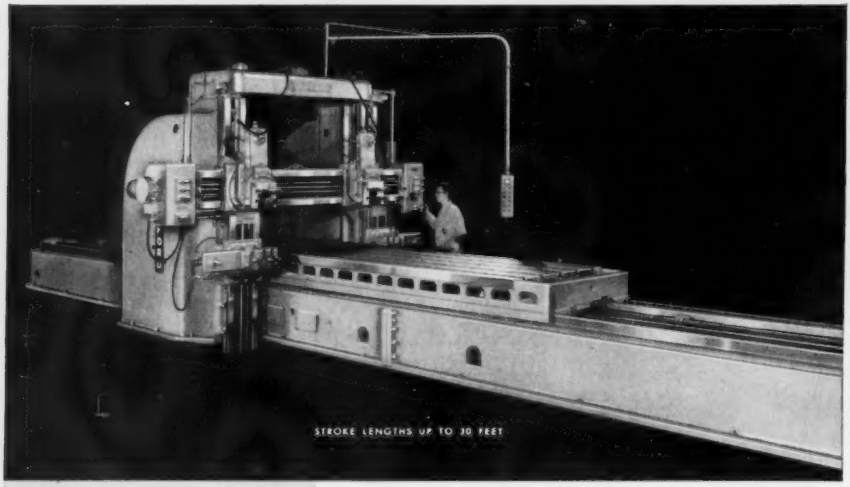
HYDRAULIC

fast, economical production calls for

HYDRAULIC

hydraulic planers with exclusive triple circuit

HYDRAULIC



Hy-Draulic

Hydraulic Drive is a natural for reciprocating-type machine tools. It provides smooth, powerful cutting, fewer moving parts, and longer useful life.

Hydraulic Planers have the new Triple Circuit which provides easy selection of the correct combination of cutting speed and force to most economically machine every type of material — free-cutting materials to the toughest steels.

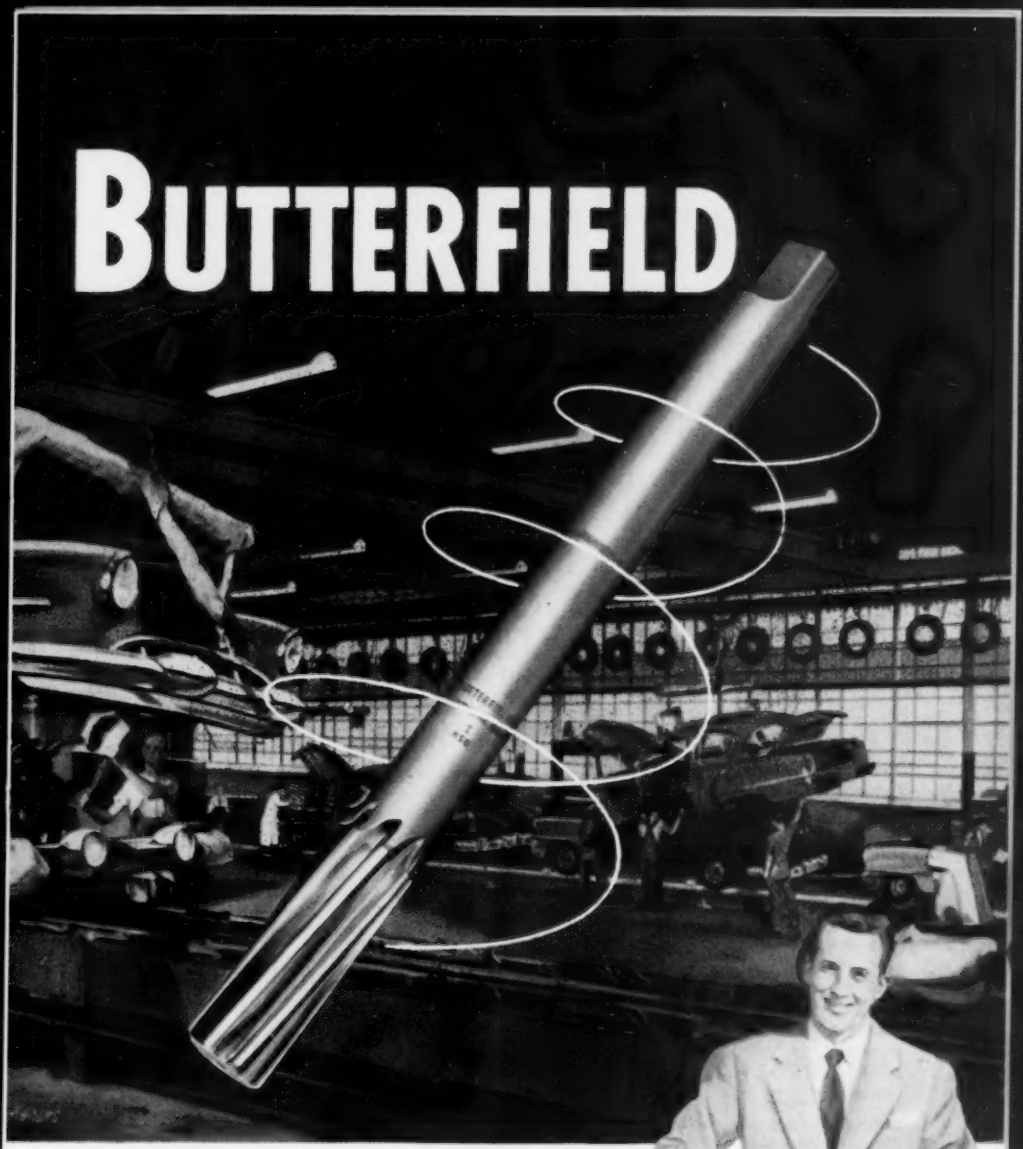
When you modernize your production facilities plan on Hydraulic Shapers, Planers and Slotters to provide the fastest, most economical production methods.

ROCKFORD MACHINE TOOL CO.

2500 Kishwaukee Street • Rockford, Illinois

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BUTTERFIELD



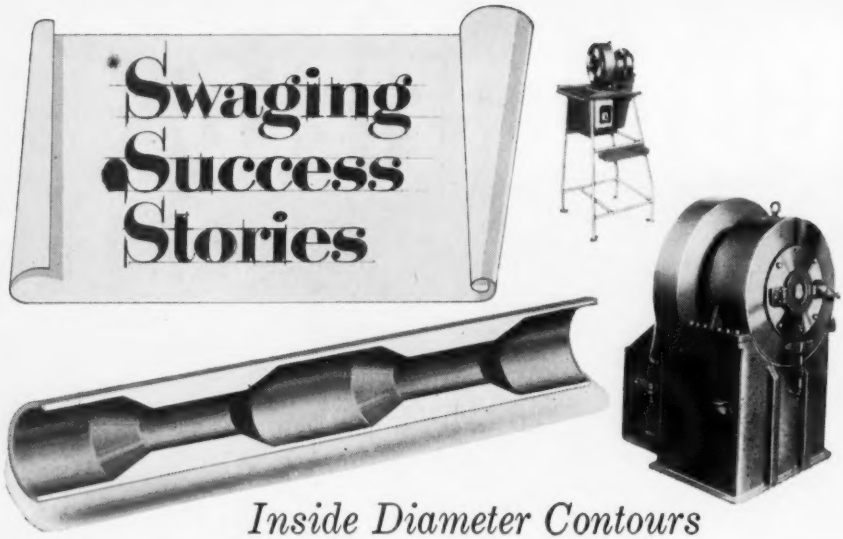
A COMPLETE LINE OF QUALITY cutting tools is now available from your Butterfield distributor. Reamers are made to the same exacting standards as Butterfield Taps, Dies, Milling Cutters, Drills, Counterbores and End Mills.

UNION TWIST DRILL COMPANY
BUTTERFIELD DIVISION
DERBY LINE, VERMONT, U. S. A.

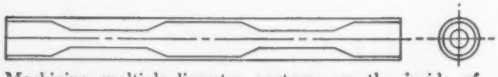
FOR FAST, ECONOMICAL SERVICE
CALL YOUR **BUTTERFIELD**
DISTRIBUTOR



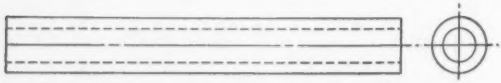
Swaging Success Stories



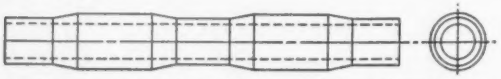
Inside Diameter Contours ... Easily Produced by Swaging



Machining multiple-diameter contours on the inside of cylindrical pieces (Fig. 1) is a difficult, time-consuming job.



Torrington's Swager experts start with tube of larger OD (Fig. 2) and machine the blanks to predetermined outside shape (Fig. 3).



Simply by swaging the outside to a straight, uniform diameter, the intricate contours are transferred to the inside (Fig. 4). Result: a sizeable saving in machining costs.



Swaging Advantages...

No Chips... No Waste... No Scrap

Swaging reduces metal—saves material —does not cut it away wastefully.

Swaging work hardens metal—gives it added strength, better finish and resiliency, dimensional accuracy.

Swaging is fast—can be done by unskilled workers to produce more pieces at lower cost.

Write for our informative booklet on Swaging that gives detailed descriptions of Torrington Rotary Swagers. It may show you how to achieve new savings in your own plant.



THE TORRINGTON COMPANY
Swager Department
730 North Street, Torrington, Conn.
Makers of Torrington Needle Bearings

TORRINGTON ROTARY SWAGING MACHINES

For more data circle **243** on Reader Service Card

Across the range of polishing jobs . . .

Norton ALUNDUM* B Abrasive

adds the "TOUCH of GOLD" that steps up production and profits

In Norton ALUNDUM B abrasive you get a truly all-purpose polishing grain, expertly engineered to cut costs and improve product quality "across the board" in your polishing operations. Here are some typical advantages that mean top performance in every set-up:

- ***Uniform grain shape,*** the result of careful processing that eliminates flats and slivers, leaving only solid, blocky grains that stand up better and polish faster.
- ***Uniform grain sizings,*** with no oversize grains that mar the finish, no undersize grains that skip their share of work.
- ***High capillarity,*** assuring the easy absorption of adhesive that means longer lasting, better performing set-up wheels.
- ***Usable with cement or glue,*** it is equally firm-clinging and efficient with either.
- ***Made in all grit sizes*** from 20 through 240, to cover the widest range of polishing jobs, from roughing to fine finishing.

See your Norton Distributor

for prompt deliveries of Norton ALUNDUM polishing abrasive. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone directory, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.



Finishing With The "Touch of Gold". In the finer grit sizes ALUNDUM B abrasive is unequalled for the polishing that means better looking products.



Roughing With The "Touch of Gold". ALUNDUM B abrasive in the coarser grit sizes, removes stock faster, saves time and money.

Making better products . . . to make your products better

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

G284

NORTON

and its BEHR-MANNING division

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

For more data circle **244** on Reader Service Card

3 Reasons Why

Taft-Peirce Superpower Magnetic Chucks Save You Money

1 — *You get the "right" chuck for every job.* T-P offers you a complete line of *both* Electromagnetic and Permanent Magnet Chucks. A P-M Chuck has no wires to fail . . . no current to heat . . . it's the safest, most economical choice for many jobs. Ideal for grinding, light milling, planing, shaping, and bench work. Since we also make electromagnetic chucks, we'll be glad to advise you which is best for your job.

2 — *T-P Cost-Cutting Designs.* T-P offers you a selection of work-saving models — in practically all standard sizes and shapes. Maybe you need a T-P Superpower Chuck that tilts or swivels to save setup time. Or a fine mesh chuck to hold small or thin sections. Or a longitudinal pole chuck for greater versatility. Taft-Peirce makes them all and many more. Plus practically any special design you may need.

3 — *Maximum Power and Performance.* Taft-Peirce Superpower Magnetic Chucks combine maximum holding power with maximum working surface. Magnetic losses are low. Safety factors generous. Rugged, rigid, one-piece all-steel body is waterproof and shockproof. Little or no maintenance is ever required.



For information on Superpower Chucks and other items send for your copy of the Taft-Peirce Handbook.

THE TAFT-PEIRCE MANUFACTURING COMPANY, WOONSOCKET, RHODE ISLAND

For more data circle **245** on Reader Service Card

ACCO products

Wilson "Rockwell"* Hardness Testers



Ohmite uses WILSON "Rockwell"* equipment to help maintain quality

• Ohmite Manufacturing Company, nationally-known makers of rheostats, resistors and tap switches, starts manufacture by making sure of exactly the right materials. Incoming metals are tested on a WILSON "Rockwell" hardness tester. This not only assures use of only quality metals but helps eliminate waste. Metals unsuitable for certain types of parts have sufficient hardness for other uses.

The Ohmite Mfg. Company uses a wide variety of anvils and scales to test hardness of incoming shipments. Carbon steel, cold rolled steel, brass, and phosphor bronze are tested in both as strip and as small parts.

There is a WILSON "ROCKWELL" Hardness Tester to meet every requirement, including the WILSON Tukon for micro-indentation testing. Write for literature and prices.

**Trade Mark Registered*

ACCO

TRADE MARK

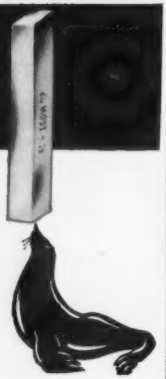
Wilson Mechanical Instrument Division
AMERICAN CHAIN & CABLE

230-G Park Avenue, New York 17, N. Y.

BRALE DIAMOND PENETRATORS AND ACCESSORIES

For more data circle **246** on Reader Service Card

A BIT OF BALANCE



Try it and get more for your money

du MONT

High Speed, Ground Square and Rectangular

TOOL BITS

have the wear resistance, toughness and red hardness precisely balanced so that you get *more cuts per bit and per dollar.*

They keep a keener cutting edge over a longer period.

Make your own performance tests and cost comparisons and you'll specify du Mont H. S. Tool Bits from then on.

The du MONT CORPORATION, Greenfield, Mass.

MAIL FREE Tool Bit COMPARISON CHART, CATALOG and PRICE LIST S to

Name.....

Company.....

Address.....

For more data circle **247** on Reader Service Card

Meetings

Important Meeting Dates

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

March 28-April 1 • American Society for Metals, 9th Western Metal Congress and Exposition, Pan-Pacific Auditorium, Los Angeles. Society headquarters: 7301 Euclid Ave., Cleveland 3, Ohio.

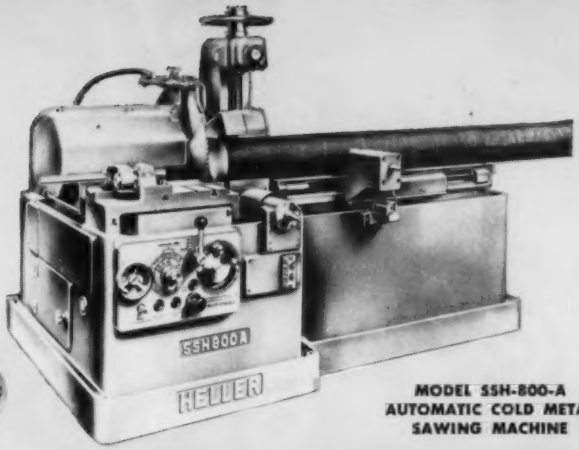
April 13-15 • American Society of Lubrication Engineers, 10th Annual Meeting and Lubrication Exhibit, Hotel Sherman, Chicago. Society headquarters: 84 E. Randolph St., Chicago 1, Illinois.

April 27-29 • Society for Experimental Stress Analysis, Spring Meeting, Hotel Statler, Los Angeles. Society headquarters: P. O. Box 168, Central Square Station, Cambridge 39, Massachusetts.

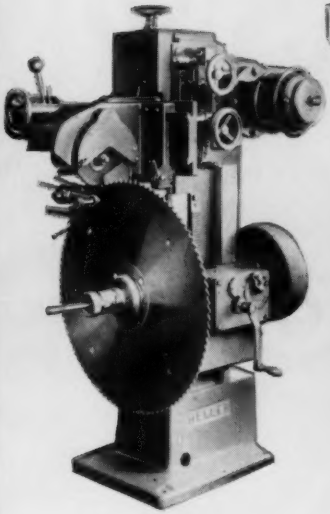
May 10-12 • Metal Powder Association, 11th Annual Meeting and 1955 Metal Powder Show, Bellevue-Stratford Hotel, Philadelphia. Association headquarters: 420 Lexington Avenue, New York 17, N. Y.

May 12-14 • American Institute of Industrial Engineers, 6th Annual Conference and Convention, Kingsway Hotel, St. Louis.

May 16-20 • American Materials Handling Society, 1955 National Materials Handling Exposition, International Amphitheater, Chicago. Information: Clapp & Poliak, Inc., 341 Madison Ave., New York 17, New York.



MODEL SSH-800-A
AUTOMATIC COLD METAL
SAWING MACHINE

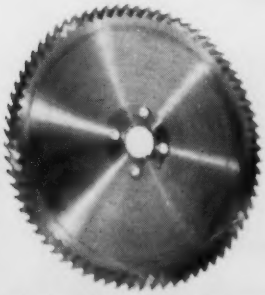


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AUTOMATIC SAW SHARPENING
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Increasing Efficiency with

HELLER

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BLADE SHARPENING MACHINES
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Norton Vitrified Bonded Diamond Wheels feature fast stock removal, high resistance to grooving and long service life. *Typical Applications:* production grinding of single-point carbide tools; grinding chip breakers; precision grinding of carbide tools, cutters, discs, gages, rolls, etc.





Norton Resinoid Bonded Diamond Wheels are made in two bond types — regular, for wet grinding and B6, for dry grinding. Each type gives extra fast cutting action and long wheel life. *Typical Applications:* grinding multi-tooth cutters; cutting-off damaged carbide tools; grinding threads from solid in carbide taps and thread gages.



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Norton diamond wheels bring unbeatable economy to <u>your</u> production

Backed by Norton's long leadership in development and manufacture, Norton diamond wheels are carbide grinding's recognized "Crown Jewels", with a royal reputation for better, lower cost grinding!

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NORTON: was first to introduce resinoid, metal and vitrified bonded diamond wheels . . . does all its own sizing, grading and laboratory checking of diamonds . . . duplicates wheel specifications with constantly controlled accuracy, to assure you uniform top performance . . . brings you a complete line, covering every diamond wheel application in every field — stone, glass, ceramics, etc.

Your Norton Distributor

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Norton Metal Bonded Diamond Wheels are engineered for top savings where great durability and resistance to grooving, rather than a fast rate of cut, are chief requirements. *Typical Applications:* sharpening single-point carbide tools; reconditioning dull or chipped carbide tools; cutting-off sintered and carbide blanks and a wide range of other materials such as glass, porcelain, germanium, cermets and stone.



W-1615

NORTON

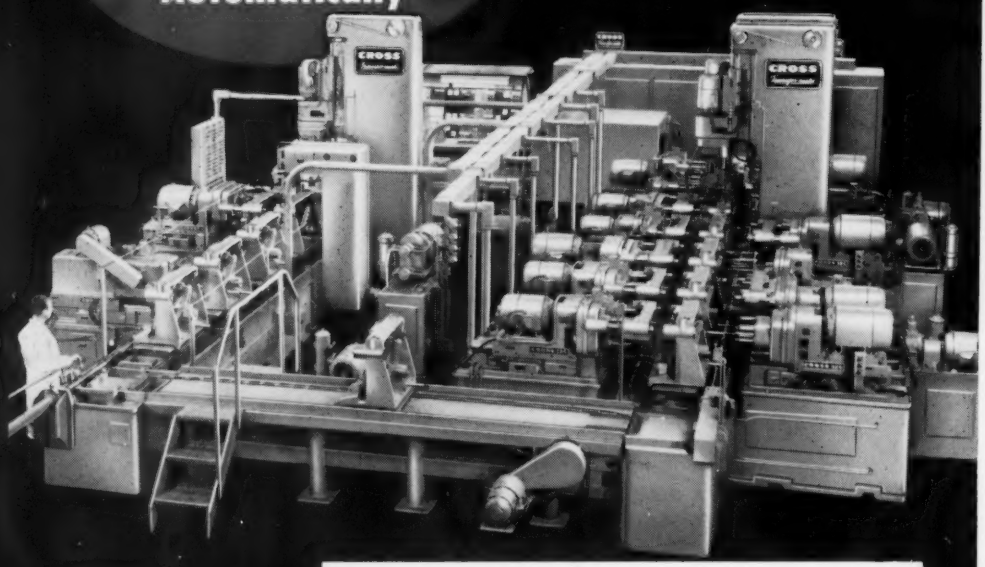
and its BEHR-MANNING division

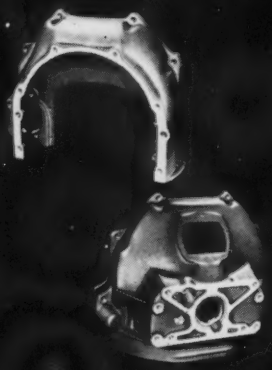
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Machines Flywheel Housings and Changes Set Up Automatically





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- ★ Hydraulic power wrench for clamping parts.
- ★ Other features: Complete interchangeability of all standard and special parts for easy maintenance; construction to J.I.C. standards; hardened and ground ways; hydraulic feed and rapid traverse; automatic lubrication.

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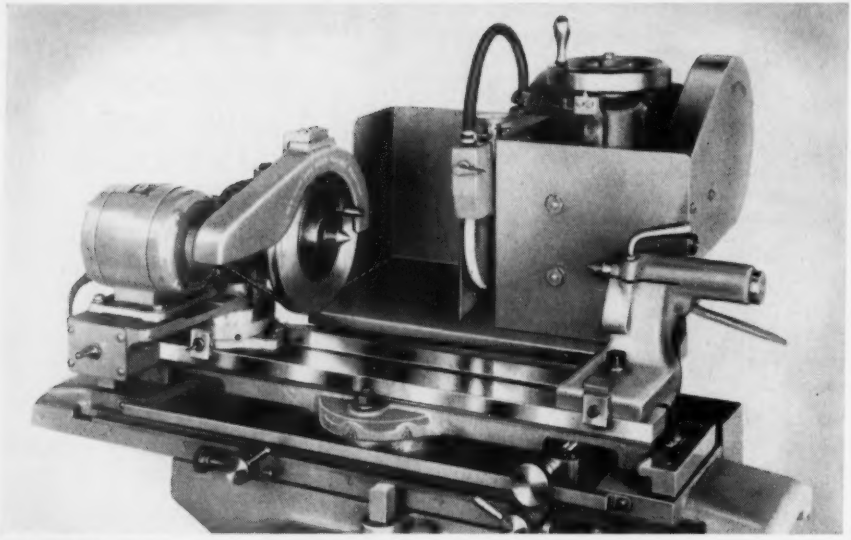
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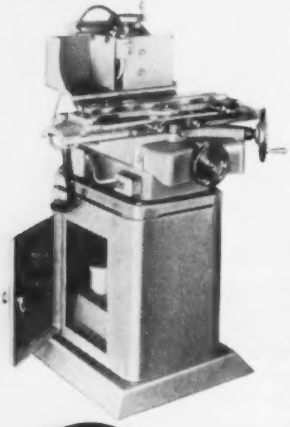
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EXCEL No. 6



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Coolant attachment includes special grinding wheel guard, splash guards and piping as well as portable coolant tank, pump and motor which are installed inside pedestal of machine.

It will pay you to investigate this coolant attachment and the Excel No. 6 which accurately sharpens all types of metal working tools such as milling cutters, reamers, counterbores and end mills. So send for Bulletin M-45.

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in product performance

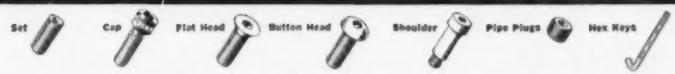


P-K means OK right down the line. *When you buy* P-K Socket Screws, it means OK for guaranteed quality and tolerance gaged to highest standards. *On the job,* it means OK for advanced design features that speed the job, prevent errors, like SIZE-MARK on P-K Cap Screws. *When you sell* your product, it means OK for lasting strength, dependable performance proved in millions of assemblies.

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JUST a couple of passes with a handy NORBIDE Dressing Stick is all it takes to clean up a wheel face, dress a radius or groove or touch up a cup or saucer wheel. And with this conveniently sized stick you can see more of the wheel and thus avoid costly overdressing.

A NORBIDE Stick of boron carbide—the hardest material made by man—will outlast hundreds of ordinary abrasive sticks. You'll find it will greatly reduce dressing dust nuisance also.

Order a supply of these cost-cutting sticks from your local Norton distributor or write for Form 1567 giving more details.

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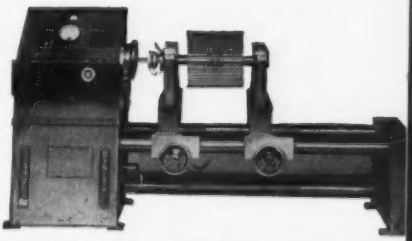
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Maybe it's a crankshaft or an armature . . . perhaps a fan or a belt pulley. No matter. The important thing is this: If it isn't *balanced,* it isn't ready for service.

Smooth operation and long life require that accurate static and dynamic balance be rated right along with mechanical specifications to assure the efficiency of the finished product.

Gisholt Balancing Machines can locate and measure unbalance vibrations down to .000025" with simple readings . . . handle any assembly from ½ ounce to 50 tons.

The cost? Very moderate. Let Gisholt Balancing Machines provide the final check. Write us.



The Gisholt Type 3U Balancer **shown here is capable of balancing rotating parts or assemblies weighing from 50 to 1000 pounds. Other sizes and types are available to answer any balancing problem. Gisholt Balancers can also be furnished with correction equipment to meet your own specific requirements.**

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

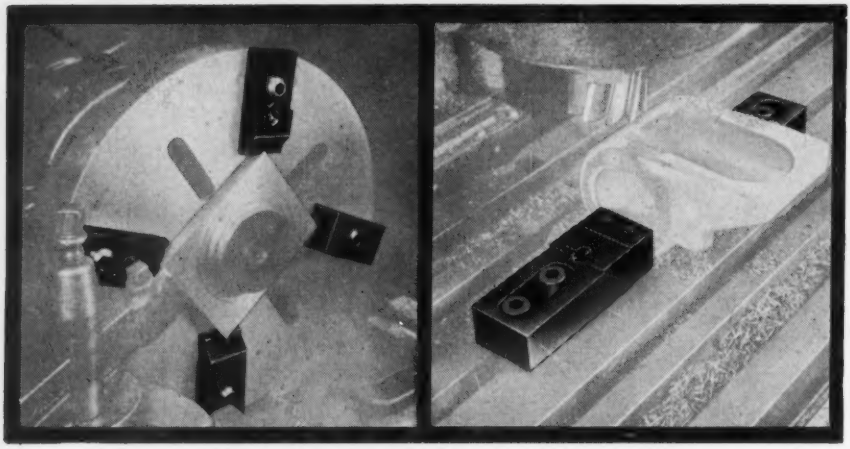


GISHOLT MACHINE COMPANY

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Eliminate "U" Clamps, Straps and Fingers, cut handling time 75%

J & S "All-Purpose" Jaw Clamps give you many unusual advantages in securing workpieces to machine tools—save as much as 75% of the time required with outdated methods.

Downholding Principle

J & S' *downholding* principle makes this possible. Here's how it works: When you turn the adjusting screw of the clamp, the jaw travels straight *in* and *down*. This forces the workpiece horizontally against the opposite clamp and downward against the face plate or table. In this way, centering is quick, simple. The tapered slot prevents the clamp from slipping regardless of the load.

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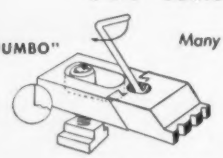
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For large planers

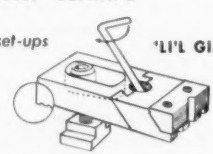
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"JUMBO"



COMPLETELY HARDENED

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Both clamps have T-nuts which fit all large standard planers. 45° oblique travel of jaw secures workpiece against table and against counterthrust of opposite clamp. 1/16" back taper (dotted line) and relieved ground surface (magnified detail) prevent slippage

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can you order from stock at your nearby DANLY Branch?

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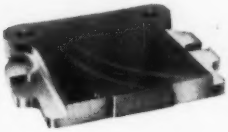
☐ 1251 ?

☐ 4763 ?

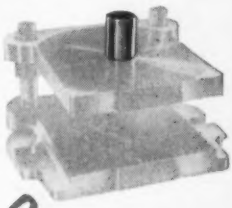
☐ 31,104 ?



3 different punch holder thicknesses



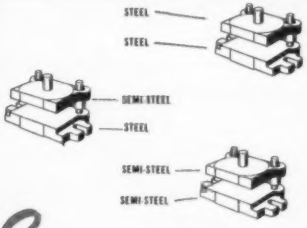
3 different die shoe thicknesses



6 shank size variations



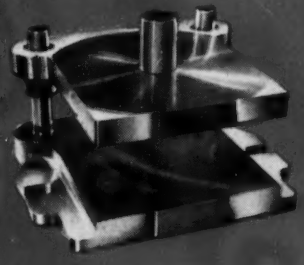
4 bushing type variations



3 different material combinations



16 guide post lengths in each of **3** different styles to choose from



Multiply all of these combination possibilities together and you'll discover that there are *31,104* different standard Danly Die Sets in just this *one* size . . . and all are cataloged and *stocked* in the Danly Branch near you. Amazing? Yes, but it serves to illustrate an important point for *your* benefit. The almost unlimited variety of Standard Danly Die Sets *in stock at your Danly Branch* will meet your specific needs exactly . . . and fast. So remember, when you want the best in die sets in the shortest time, the place to call is your local Danly Branch.

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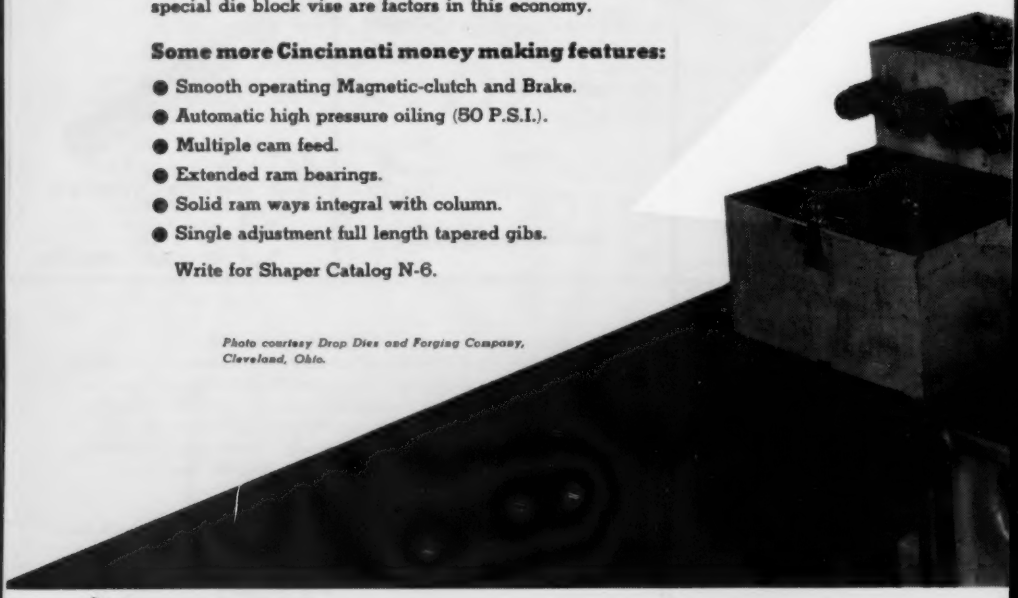
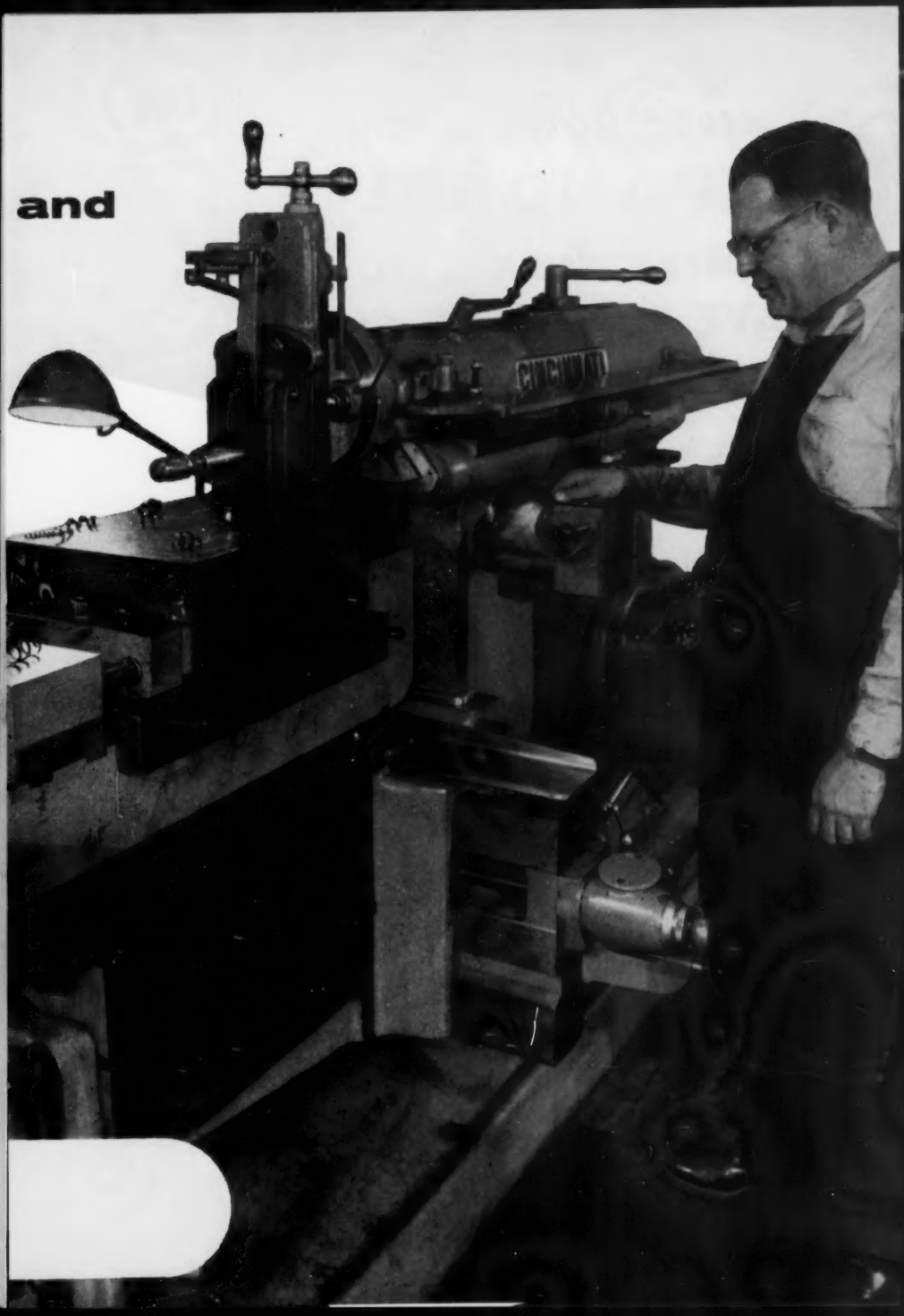


Photo courtesy Drop Dies and Forging Company, Cleveland, Ohio.

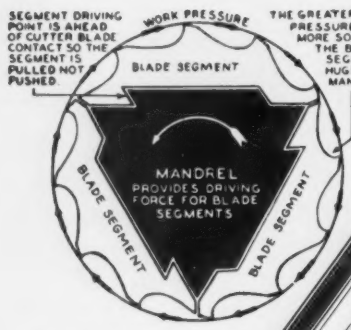
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HERE'S HOW LEMPCO EXPANDABLE REAMERS WORK . . . TO SAVE YOU MONEY!



NOTE THAT THE MANDREL DRIVES THE BLADES

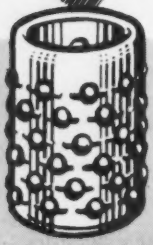


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always measure up!

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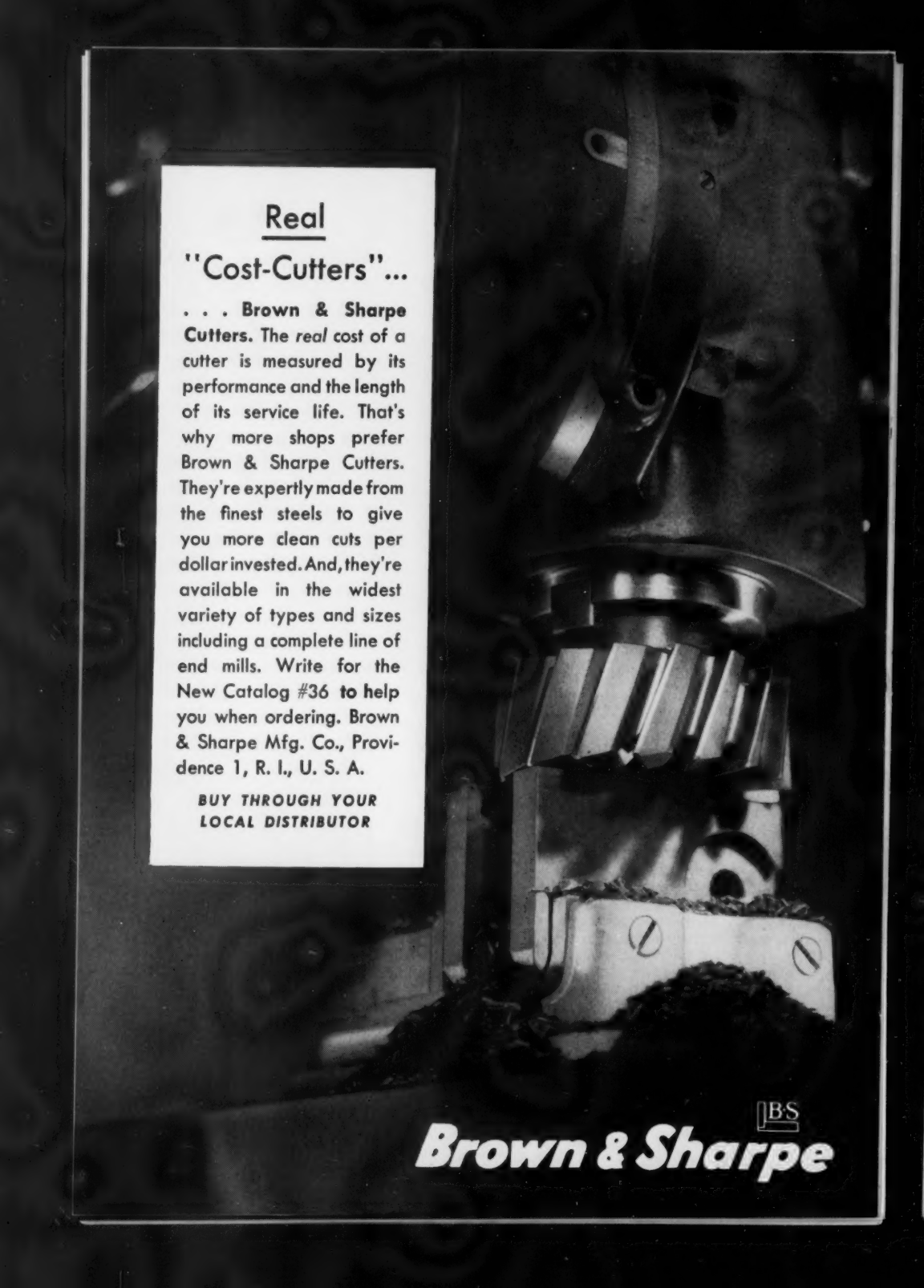
Socket screw users who want *what* they want *when* they want it know it pays to specify B-RIGHT-ON! Brighton Socket Screw Products *always* measure up. Standard or special, Brighton Screws must meet and pass factory standards that are higher even than those specified by the ultimate user of the screws. Rigid control, from initial steel selection to final packaging, certifies every screw as B-RIGHT-ON quality. Selected mill supply houses, Brighton distributors, complete the control chain, assure the user of service and delivery as dependable as the screws . . . B-RIGHT-ON service.

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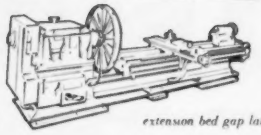
used in atomic energy projects
excellent for maintenance



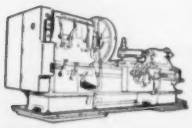
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NOW READY
FOR ANY CHALLENGE!

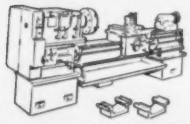
Nebel lathes are approved by every important industry, and for almost every government project. Continuously improved since 1889, they're ready for your assignment. Write for bulletin. The Nebel Machine Tool Co., Cincinnati 25, Ohio.



extension bed gap lathes



engine lathes



removable block gap lathes

Nebel
LATHES
CINCINNATI

workhorse of the metal-working shop since 1899

For more data circle **264** on Reader Service Card

FOR

New, light-weight, heavy-duty No. 404



MILLERS FALLS GRINDERS

Latest addition to Millers Falls famous line of portable electric grinders, the No. 404 weighs only 9¼ lbs., yet has a 5.5 amp. rating. It uses 4" diameter wheels up to 1" wide and is designed for continuous heavy-duty service such as snagging castings, grinding welds, grinding off rivets, etc. Other models up to 6" with speed ranges from 3700 r.p.m. to 5500 r.p.m.

FASTER

High-speed, high-powered No. 270



MILLERS FALLS POLISHERS

This advanced-design polisher has the extra power (a full 5 amps.) and greater spindle speed (1900 r.p.m.) needed for best results with the latest type cleaners and polishers. Standard equipment includes deep, carpet-pile wool pad, the most effective polishing head ever developed.

FINISHING

MILLERS FALLS SANDERS

MILLERS FALLS TOOLS
SINCE 1868

The Mark of Superiority

Light, high-power No. 870

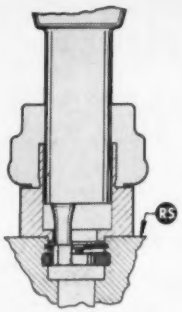
A beautifully engineered 7" unit. Weighs only 7½ lbs., but with a full 5.5 amp. rating. Perfect for driving the new laminated phenolic grinding wheels and discs as well as for fast sanding. Other models up to 9".



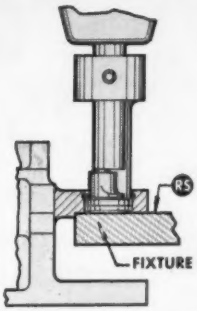
FREE literature on request. Or, let us arrange a demonstration. Millers Falls Company, Dept. MM-6, Greenfield, Mass.

For more data circle **265** on Reader Service Card

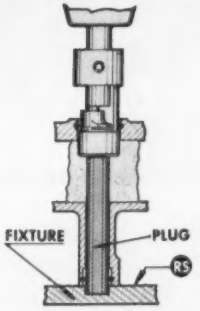
Even Unskilled Labor Can Use This Versatile Tool Accurately! It Simplifies Internal Grooving Problems, Cuts Production Costs!



A) Cuts two grooves of different depths and widths in one single operation from same reference surface.



B) Cuts groove in bore located in protruding member of workpiece. Reference surface on under side of protrusion.



C) Cuts grooves in two bores of different diameters from same reference surface. Tool banks on reference surface. Then workpiece is reversed and tool banks on plug.



Amazingly versatile! Your toughest recess cutting problems can be met simply and efficiently with the Waldes Truarc Grooving Tool because it offers a whole range of possibilities beyond the range of ordinary recessing tools.

Wide Cutting Range! The Waldes Truarc Grooving Tool comes in 5 models... enabling you to cut accurate grooves in housings with diameters from .250 to 5.00 inches.

Send Your Problems to Waldes! Send us your blueprints... let Waldes Truarc Engineers give you a complete analysis, price quotation and delivery information on the most economical tool set-up for your particular job. There is no obligation!

Write NOW for a 20-page manual containing full information on Waldes Truarc Grooving Tool



WALDES

TRUARC®

GROOVING TOOL

Made by the Manufacturers of Waldes Truarc Retaining Rings
WALDES KOHINOOR, INC., 47-16 Austel Place, L. I. C. 1, N. Y.
Waldes Truarc Grooving Tool Manufactured
Under U. S. Pat. 2,411,426

MM-047

Waldes Kohinoor, Inc., 47-16 Austel Pl., L.I.C. 1, N. Y.

Please send me your new 20-page technical manual on the Waldes Truarc Grooving Tool. (GT-2-53)

Name_____

Title_____

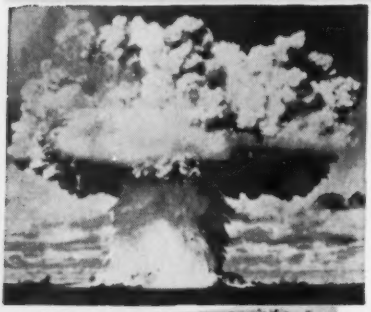
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City_____ Zone_____ State_____

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JOHANSSON GAGING EQUIPMENT



Assures You Precision to the Finest Degree, to Meet Your Most Exacting Requirements— Backed by the Name Supreme in the World of Measurement.

Swedish Johansson Gage Blocks are checked for accuracy by the latest scientific method, the atomic light, utilizing the lightwaves emitted from the Mercury isotope 198, now in use at the standard Bureaus throughout the world.

GAGE BLOCKS

(JOHANSSON) and accessories. Short deliveries. Inspection and reconditioning service available at our plant.

MIKROKATOR

(Amplifier — for outside measurements) Graduations .0001 to .000002 or .001 M to .0002 M.

INTERNAL INDICATORS

(for inside measurements .155 to 24 inches). Scale range plus or minus .001 graduated to .0001 and minus .020 graduated to .0001.

OTHER JOHANSSON PRODUCTS

Micrometers, Snap Gages, Extensometers, Dynamometers, Hardness Testers, Surface Finish Indicators, Interferometers, Plugs, Rings and Special Gages.

Write for Literature

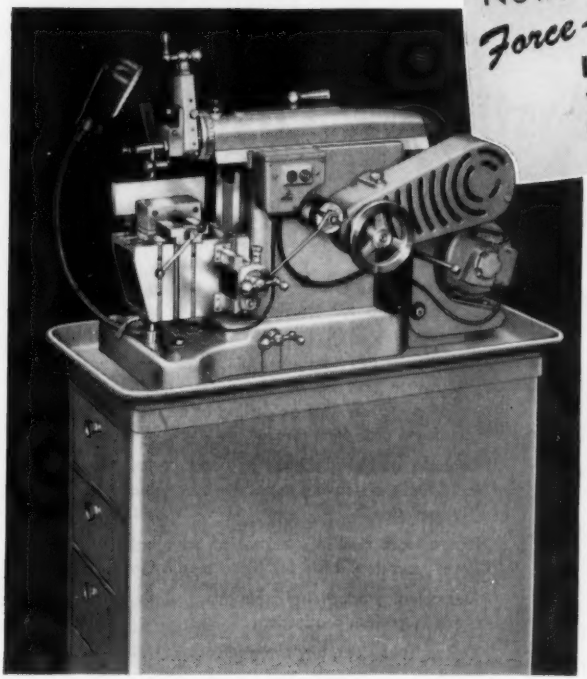
C. E. JOHANSSON GAGE CO.

A DIVISION OF SWEDISH GAGE CO

10641 HAGGERTY AVE. • BOX 4086 NORTHEASTERN STATION • DEARBORN 1, MICH.

For more data circle **267** on Reader Service Card

New! *Force-Feed* LUBRICATION TO ALL IMPORTANT BEARING SURFACES



SOUTH BEND 7" Shaper

THE ONLY BENCH SHAPER WITH CIRCULATING FORCE-FEED LUBRICATION TO IMPORTANT BEARING SURFACES

SPECIFICATIONS

Ram
Stroke length—0 to 7". Strokes per minute (4)—42 to 195.

Tool Head
Travel—3". Swivels—360°

Table
9½" horizontal travel, 5" vertical. Power cross-feeds (6)—.002" to .012". Clears ram—½" to 5½".

You will be surprised at the variety of jobs this well-built 7" precision bench shaper will do. With it you can machine keyseats in shafts, pulleys, or gears; finish flat surfaces; square ends of shafts; machine slots, dovetails and grooves. Price $551 f.o.b. factory, less motor and stand.

Compared with our costs
OUR PRICES ARE LOWER
than they were back in 1941



Prices are closely tied to costs. Costs are still rising. Buy now before increased costs necessitate higher prices.

SEND INFORMATION CHECKED:


☐ 9" and 10" BENCH LATHES


☐ 10" to 16-24" FLOOR LATHES


☐ DRILL PRESSES


☐ TOOL GRINDERS


☐ ½" & 1" Collet TURRET LATHES


☐ 7" BENCH SHAPERS

Name_____ Street _____

City_____ State _____

Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana

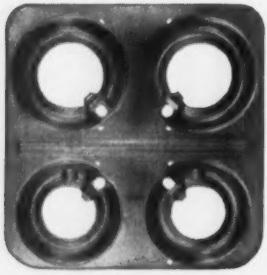
For more data circle **268** on Reader Service Card

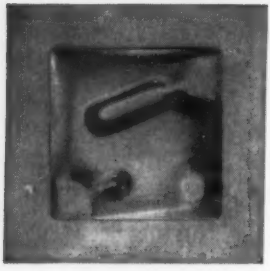


Plastic Low Cost Tooling

For

Dies · · · Drill, Welding, and Assembly Jigs





Vulcan, keeping pace with modern tooling, can recommend plastic tooling for medium production on numerous tool programs.

Plastic tools are light in weight, have good impact, compressive strength and dimensional stability. No hand finishing of parts required as galling or marking is eliminated by using plastic form dies.

Contours and odd shapes are cast or laminated to suit individual tools, saving expensive machine and hand finishing operations.

Plastic tools, built in a matter of days instead of weeks, lower your tool costs for those medium production runs.

Our actual production figures prove plastic has a definite place in modern production.

Vulcan Tool Company's organization, building fine tools since 1916, believes new tooling developments must be proved by tool engineers. Since plastic is not a cure-all your problem should be handled by recognized, practical tool men.

Our engineering staff will recommend the correct plastic material and advise if parts of your tooling program should be in plastic.

Send a part print and your production requirements for quotation and recommendations.



Major Vulcan Services . . . Engineering, Processing, Designing and Building . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and size. Vulcanaire Jig Grinders . . . Motorized Rotary Tables . . . Plastic Tooling.

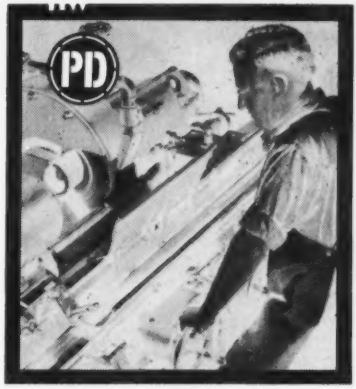
VULCAN TOOL CO....PLASTIC TOOL DIVISION

727 LORAIN **DAYTON, OHIO**

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The most talked about development in years...

JUST AS A NEGATIVE guarantees you an exact duplication of a photograph each and every time, you are always assured a . . .



. . . POSITIVE DUPLICATION of an original grinding wheel each and every time through the CINCINNATI (PD) Manufacturing Process.



NOW!

Cincinnati Grinding Wheels offer

PD Positive Duplication

Positive Duplication is an outstanding development in precision manufacturing and quality control that can *save you money* and *increase production.*

Through the CINCINNATI (PD) Manufacturing Process you are assured a Positive Duplication of the original wheel *every* time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike. *Yet* CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.*

Investigate! Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

CINCINNATI *Grinding Wheels*

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

For more data circle **270** on Reader Service Card



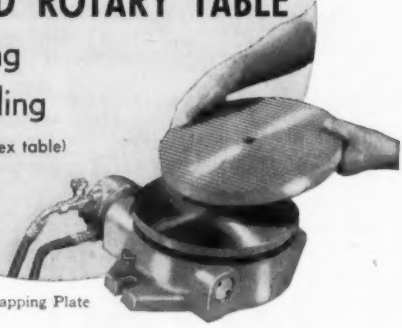
With Permanent Magnetic Chuck

NEW *Vulcan*

MOTORIZED ROTARY TABLE

for lapping and grinding

(not an index table)

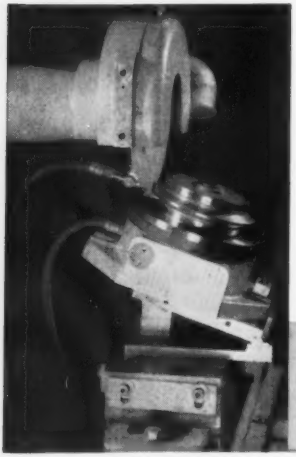


With Lapping Plate

FASTER
circular precision grinding!

Now with this table and with less effort you assure highest standards of accuracy, flatness, finish and close tolerances. At the same time you eliminate slow and complicated tool setups. You cut grinding time greatly by using only cross feed while the table is rotating at infinite speeds between 40 and 100 RPM.

For example, Vulcan's Rotary Table can be used in connection with a sine plate or angle fixture. The dressing of large expensive external wheels for side grinding is therefore eliminated. If you wish we can provide permanent magnetic chucks designed for use with our table, both 6″ and 10″ in diameter.



Work clamped to motorized table, mounted on sine plate. Surface grinder application.

Vulcan's Rotary Table is an air operated, self contained unit, portable between bench or machine. A precision center hole for locating and tapped holes in the table for clamping provides easy setup. Circular surface grinder applications are many and varied — grind flanged studs or bushings — bearing spacers — forming rolls — cutters — convex or concave surfaces — punches or dies (radius or angle).

Lapping? Yes — and in micro inches. For the 6″ and 10″ table, lapping plates of 12″ and 16″ are provided. Perfect for lapping valve plates, gages, bearing spacers and for carbide lapping using diamond powder. *Write for circular.*

Major Vulcan Services

Engineering, Processing, Designing and Building . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and size. Vulcanaire Jig Grinders . . . Motorized Rotary Tables . . . Plastic Tooling.

VULCAN TOOL CO.

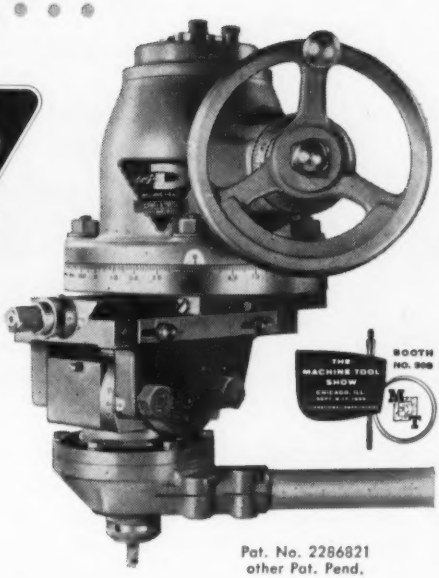
720 LORAIN • DAYTON, OHIO

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Presenting . . .

the NEW tri-D MILLING HEAD

KEARNEY & TRECKER MILWAUKEE



Pat. No. 2286821
other Pat. Pend.

for use with most horizontal and some vertical milling machines . . . any make.

TRI-D adapted to your milling machine can produce in metal almost any geometric shape employing straight lines, radii or angles . . . all in a single setup. Power is transmitted to the spindle through a heavy-duty flexible shaft driven by the machine spindle or a variable speed motor unit.

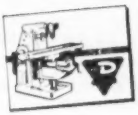
Find out how you can increase production and cut milling costs with the new TRI-D. Contact your Kearney & Trecker representative now!

Kearney & Trecker CORPORATION
MILWAUKEE 14, WISCONSIN

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

Only tri-D MILLING HEAD has all 3 . . .

Ask for our FREE Catalog No. TD-10.





1. LATERAL ADJUSTMENT of the cross-slide permits off-setting the spindle up to 2½". A large dial, graduated in thousandths, is mounted on the cross-slide screw. Precision-ground screw assures the ultimate in accuracy and long life. A friction lock secures cross-slide positions.



2. ROTARY MOVEMENT of the head through a complete circle, or any specific part, is easily accomplished by turning handwheel in either direction. Combined with lateral adjustment of the cross-slide, this rotary movement permits milling of circles up to 5" in diameter.



3. ANGULAR ADJUSTMENT of cutter, an exclusive feature, is the swivel block which permits positioning of the cutter at any angle in the vertical plane, up to 15°, either side of center. Easy-to-read graduations make setting to a precise angle a very simple operation.

For more data circle **272** on Reader Service Card

Tough grinding jobs?

Check *Vulcanaire* high speed precision grinding heads!



Grinding circular slot using Vulcan's Rotary Table and Magnetic chuck.

Many seemingly impossible grinding problems have been solved by adapting Vulcanaire to standard machines or by using one of Vulcan's specially designed machines.

On Surface Grinders, merely remove wheel and guard, clamp vertical or horizontal adaptor to machine as illustrated. No belts necessary. For instance, Vulcanaire used in connection with Vulcan's Rotary Table for Surface Grinders permits the grinding of a circular slot.

Adaptors are in stock to fit the spindle of Vertical Milling Machines for grinding contours, holes and slots.

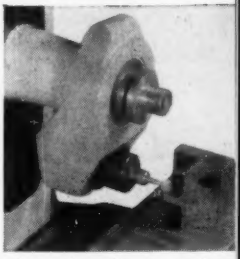


Vertical adaptor for Surface Grinders. Grinding small slots

On Internal Grinding Machines Vulcanaire's infinitely controlled speeds furnish the correct surface cutting speed resulting in faster production and micro finish. The adaptor sleeve fits into present housing.

Applied to Jig Boring Machines, Vulcanaire is liked by leading precision manufacturers because its accuracy is guaranteed, producing Vulcanaire jig grinding of large and small parts.

Send us a blue print on your toughest grinding problem. Recommendations and sketches will be returned to you — no obligation.

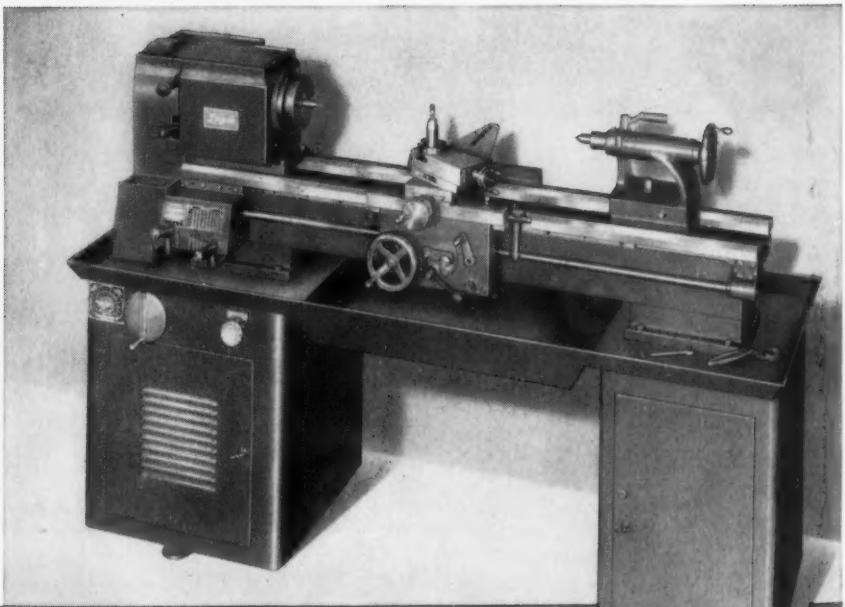


Horizontal application Grinding a Shoulder Punch.

Major Vulcan Services

Engineering, Processing, Designing and Building . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and size. Vulcanaire Jig Grinders . . . Motorized Rotary Tables . . . Plastic Tooling.

VULCAN TOOL CO. • 710 LORAIN, DAYTON, OHIO



THIS NEW 14" *Logan* LATHE

PERFORMS . . .

AND THE RESULTS PROVE ITS SUPERIORITY

The more jobs you watch this rugged new Logan "6560" perform, the more impressive it looks, On the heaviest cuts, or at maximum speed, it turns the work *smoothly*, quietly, with precision results. Superior performance is designed, engineered and built into it.

The Variable Speed Drive provides instant spindle speed correction. The oversize spindle, with 1⅜" bore, turns on a ball bearing mounting that needs no adjustment within the full range of 38 to 1200 rpm. The bed is a wide, deep special alloy casting, extra heavy and resistant to both internal and external stresses. The two V-ways and two flat ways are precision ground. Extra strength and weight throughout, plus dynamic balancing of the complete lathe practically eliminates vibration. Moderate price and low cost operation make the "6560" outstanding in economy as well as in precision performance. Write for Bulletin 14-L, giving a full description.

SPECIFICATIONS AND FEATURES

14⅛" swing over bed
9" swing over saddle
1⅜" spindle hole
1" collet capacity
40" between centers

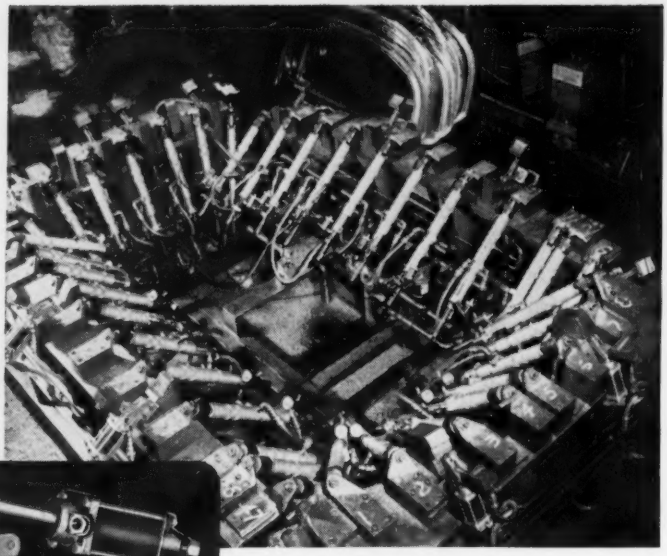
Variable Speed Drive
Ball Bearing Spindle
38 to 1200 rpm
Two-V-way, Two-flat way, Precision Ground Bed
Precision Carriage

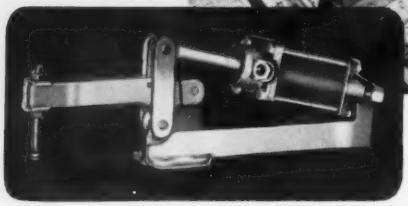
LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

LOGAN ENGINEERING CO.
Lawrence and Leamon Ave., Chicago 30, Ill.

For more data circle **274** on Reader Service Card

67 JOBS AN HOUR





MODEL AO-400

Lift a sedan roof panel onto a fixture. Clamp it tightly—in one operation! Drill 47 holes simultaneously into the roof edges. Unclamp. Remove panel and reload.

There's the production sequence of what could easily become a bottleneck at one automotive company. A fixture incorporating two unusual tools does the job. LAPEER AIR-OPERATED CLAMPS grab the panel rigidly, release upon demand. In the meantime, a battery of Keller Airfeedrills does the actual drilling in from 5 to 10 seconds. Two men handle 67 panels each hour even though most of their time is spent in handling.

Speed—accuracy—sureness—that's the Lapeer story.

You, too, can hold tight to tough jobs. It will pay to investigate Lapeer today. 4291

Send for this FREE catalog.



MANUFACTURERS OF A COMPLETE LINE OF STATIONARY AND PORTABLE CLAMPS AND PLIERS

KNU-VISE PRODUCTS **LAPEER MANUFACTURING CO.**

3048 DAVISON ROAD • **LAPEER, MICHIGAN**

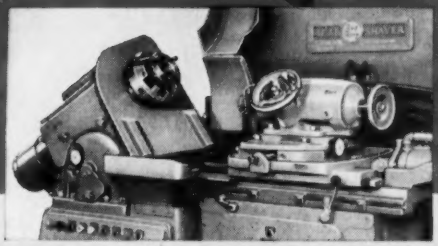
WESTERN DIVISION: 422 Magnolia, Glendale, California • CANADIAN DIVISION: Higginson Engr., Hamilton, Ontario

For more data circle **275** on Reader Service Card

New Machine *Shaves* INTERNAL GEARS *Faster* and to *Closer* TOLERANCES



This new Red Ring Model "GCR" is a high production, high precision shaving machine for a broad range of internal gears. It provides two methods of shaving and many advantages which heretofore were available only on external gear shaving machines.



THE MACHINE TOOL SHOW
CHICAGO, ILL.

BOOTH 1215

- It will precision shave all spur or helical internals 3" to 12" PD, up to 4 diametral pitch with face widths to 2½".
- It will operate on an automatic and selective feed cycle.
- It provides the opportunity to use a new, rapid **PLUNGE-CUT** shaving cycle in addition to conventional shaving.
- Crowning by the Plunge-cut method is optional.
- It will taper-shave gear teeth.
- It assures precision comparable to that established by Red Ring Machines for external gears.
- It reduces loading and unloading time to a minimum.
- It handles gears having integral shafts.

When using the automatic feed cycle a selected number of cutting strokes, each with its own selected increment of up-feed, can be combined with whatever idling strokes are desired. At the end of the cycle the machine automatically stops in the proper backlash position for rapid unloading.

If your manufacturing program includes internal gears, write for complete information on this new shaving machine.



NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

7160

For more data circle **276** on Reader Service Card

Now

CINCINNATI Sub-Zero presents . . .

for economical mechanical low temperature refrigeration



CINCINNATI SUB-ZERO A-120-1

- **Costs less than $1500.00**
- **1 cubic foot capacity**
- **Simple "plug-in" unit**

. . . more than 15 years experience in low temperature refrigeration

Here's the new CINCINNATI Sub-Zero chilling machine engineered to the needs of heat treating laboratories, experimental departments, developmental centers and similar "limited production" users. The Model A-120-1 has the capacity to chill 25 pounds of steel an hour from +80° to —120° F. It is easy to start—just plug it into a wall socket—it costs only pennies a day to operate. Hermetically sealed refrigeration; all-steel construction. Instrumentation as required. Observation window, entrance holes, heaters and other test equipment available as accessories. Other units available in sizes to meet your needs.

Write for full information

Cincinnati Sub-Zero Products

General Offices and Plant:
3930-55 Reading Rd.
Cincinnati 29, Ohio

For more data circle **277** on Reader Service Card

SEND FOR
FREE CIRCULARS.

MATTISON

HIGH-POWERED PRECISION SURFACE GRINDERS



• Rugged, High Powered and Versatile, Mattison Precision Surface Grinders with double-column construction are built to handle your grinding jobs on a real production basis, providing repeated precision results and a fine finish.

They are built with table sizes from 12″ to 36″ wide by 36″ to 192″ long.

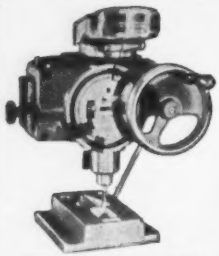
WIDE ABRASIVE-BELT GRINDING and POLISHING MACHINE

• From the time factory coated abrasives were introduced for metal polishing and grinding, Mattisons have developed and built machines properly applying belts to do the job to be done. The Wide-Belt Sheet Grinder and Polisher shown above is for finishing stainless steel and alloy sheets in sizes up to six feet wide and sixteen feet long.

MATTISON MACHINE WORKS
ROCKFORD · ILLINOIS

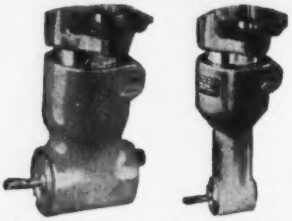
For more data circle **278** on Reader Service Card

RIGHT ANGLE ATTACHMENTS

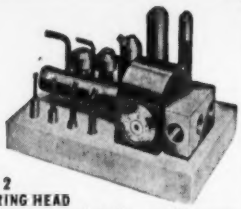


CHERRYING ATTACHMENT

Makes possible production of convex and concave shapes. Ideal for producing drop forge dies, molds, cavities, metal core boxes, etc.



(Left) Heavy Duty . . . for milling and drilling at right angles; fits both Master and 1 HP Bridgeport Heads. (Right) Light Duty . . . for right angle milling and drilling narrow, deep molds and cavities.



No. 2 BORING HEAD

Boring Tools and Holder provide means for boring holes up to 6" diameter; available for use on Bridgeport 1 HP Milling, Drilling and Boring Attachment.

A few of the Attachments available

Improved and providing great gripping power, with large diameter screw for rigid holding. Streamlined for appearance and equipped with coolant trough. Two sizes.



MILLING MACHINE ← VISE



Bridgeport

offers great versatility through its wide range of

ATTACHMENTS

"Bridgeport Millers" in themselves, are universally recognized as machines of outstanding utility. Their *exclusive method* of being able to drill, mill, bore and shape over a wide area without changing set-up, has contributed much to their universal acceptance through the convenience, economy and accuracy offered. But this is not the whole story . . .

Note the attachments shown above. Here are a few means developed by "Bridgeport" engineers to go still further in extending the versatility of these machines . . . attachments which mean not only greater convenience but which vastly extend the operations which can be performed . . . attachments which will enable one machine to do the work of several single purpose machines. Furthermore, many more jobs can be assigned to the "Bridgeport" with the result that many more productive hours are available from one machine.

Ask your dealer . . . or us . . . to show how you, too, can apply Bridgeport Attachments to extend the utility of your machines. Ask also for literature on Bridgeport Turret Milling Machines.

Bridgeport MACHINES, INC.

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

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NOW!

CIMCOOL Cutting Fluids cover ~~85%~~ 100% of all metal cutting jobs!

Here indeed is welcome news for industry, which has depended upon the five Cimcool° products to cover 85% of metal cutting operations. *Now*, through the addition of *four new products*—CIMCUT BASE ADDITIVE, CIMCOOL "CI", CIMCOOL MACHINE CLEANER, and CIMCOOL BACTERICIDE—the Cimcool family of products will serve industry *one hundred per cent!*

Now, you can have one source of supply for *all* your cutting fluids—fluids that will not only *lower costs . . . but do a better job.* Meet the entire family of *nine* Cimcool products, each one uniquely designed to serve a purpose in industry—each one developed in the laboratory and proved on the job:

CIMCOOL STANDARD CONCENTRATE—The famous pink cutting fluid which still covers 85% of all metal cutting jobs.

CIMCOOL S-2 CONCENTRATE—For heavy duty use.

CIMCOOL WATER CONDITIONER—For increased rust control.

CIMCOOL TAPPING COMPOUND—The magic compound that increases tap life amazingly.

CIMCOOL TRANSPARENT GRINDING FLUID—For superior rust control at high dilutions.

CIMCUT BASE ADDITIVE—For jobs requiring an oil-base coolant.

CIMCOOL "CI"—The cutting fluid for cast iron with exceptional rust control properties.

CIMCOOL MACHINE CLEANER—The 2-phase non-corrosive cleaner that cuts grit, dirt, slime and oil.

CIMCOOL BACTERICIDE—The most effective agent yet developed to overcome rancidity.

Our representatives will be happy to give you full details about these nine great products now serving industry 100% . . . and to prove to you, through actual demonstration, that Cimcool products *lower costs—and do a better job.*

Just contact us and we'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Write, wire, or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

°Trade Mark Reg. U.S. Pat. Off.

CIMCOOL
Cutting Fluids

100% for ~~85%~~ of all metal cutting jobs

PRODUCTION-PROVED PRODUCTS OF THE CINCINNATI MILLING MACHINE CO.



Logan RFL unit

Keeps Your Air-Operated Equipment Working At Full Capacity

MAINTAINS UNIFORM AIR PRESSURE, FILTERS AIR, LUBRICATES AIR CYLINDERS, VALVES, TOOLS

To assure capacity performance under all conditions, install the new Logan "R-F-L Unit" wherever air power is used in your plant and on the equipment you are marketing. Uniform working pressure is maintained by leveling out surges and sudden drops in the air supply. Clean, moisture-free, oiled air is supplied to assure unfailing operation, minimize wear of working parts, and increase service life of packings. The R-F-L Unit is installed in the intake line from the main air line, and can be mounted on a central control panel. Its compact, clean lines harmonize with the modern styling of your latest equipment. All components are conveniently visible on and controlled from the front panel. The upper and center knobs regulate the air pressure and oil flow, respectively—the lower knob drains the water trap.

FUNCTIONAL FEATURES

- Long life-piston-type reducing valve with long travel for accurate regulation of air pressure. Pressure gauge.
- Lubricator with control knob, oil level sight glass and filler plug located on front panel of unit.
- Removable ribbon-type air filter element to trap scale, rust, other foreign matter and water. Large water reservoir.

WHAT IT DOES

REGULATOR—Piston-type reducing valve with long travel of control permits accurate regulation of pressure from main air line as required by work. Keeps working pressure uniform with minimum air consumption.

FILTER—Supplies clean, dry air to system, thus assuring uniform and trouble-free operation. Replaceable filter element separates scale, rust and other foreign matter from air. Moisture drips into a reservoir which requires draining only once or twice a week.

LUBRICATOR—Automatically injects oil into air intake line to lubricate valves and cylinders, prevent corrosion and increase life of parts and packing. Metering needle adjustable as required by installation.

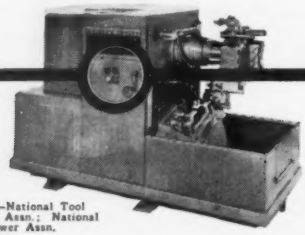
Eliminates piping, elbows, tees and reducers between components. No pipe friction.

HOW IT IS CONTROLLED

Two knobs on front panel accurately regulate air pressure and amount of oil injected as required by the individual job.

HOW IT IS INSTALLED

Install in the air intake line from the main air line. Can be mounted on a central control panel.



Member—National Tool Builders Assn.; National Fluid Power Assn.

Illustrated — Single spindle automatic chucking machine with Logan R-F-L Unit installation. Photo courtesy Warner & Swasey Co.

Logan

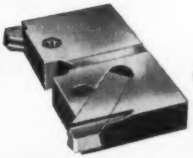
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801 CENTER AVE., LOGANSPORT, IND.

Let Logan engineers help you design your Air and Hydraulic Circuits. No obligation.

AIR CONTROL VALVES, Cat. 100-4 • AIR CHUCKS, Cat. 70-1 • AIR CYLINDERS, Cat. 100-1 • AIR-DRAULIC CYLINDERS, Cat. 100-3
AIR and HYDRAULIC PRESSES, Cat. 51 • COLLET GRIP TUBE FITTINGS, Cat. 200-5 • HYDRAULIC CONTROL VALVES, Cat. 200-4
HYDRAULIC CYLINDERS, Cats. 200-2; 200-3 • HYDRAULIC POWER UNITS, Cat. 200-1 • SURE-FLOW COOLANT PUMPS, Cat. 62

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This tapered  **V-centering Key locks**

the Cutter Block  **accurately and**

rigidly assuring dependable low cost operation

of . . . 

McCROSKY *Block-Type* BORING BARS

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"*SPECIALS*" to meet any Requirement

Many exclusive — and shop-proved — features, available only in our design, enable you to bore more pieces in shorter time with greater accuracy. High speed, cast alloy or carbide tipped blades, Standard Bars, with straight or tapered shanks, with or without pilots, for boring holes up to 15″ in dia. "Specials" often combine several related boring, facing, counterboring and chamfering operations into a single tool, cutting costs and increasing production. Write for Bulletin No. 18-B.

COST CUTTING TOOLS

McCROSKY TOOL CORPORATION
MEADVILLE, PA.

Engineering and Sales Representatives in the Principal Cities

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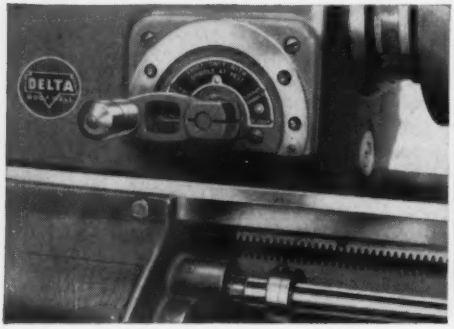
The *New* Rockwell-Built

The Finest 11" Metal Cutting Lathe *Anywhere Near Its Price...*

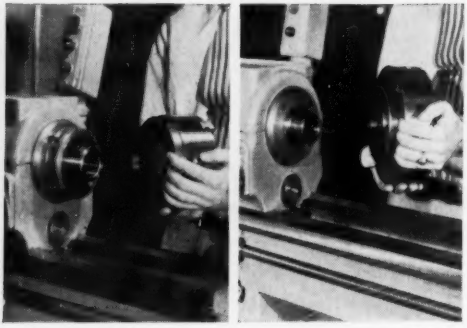
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And when you see it, you'll see why it's the finest 11" metal cutting lathe on the market today . . .

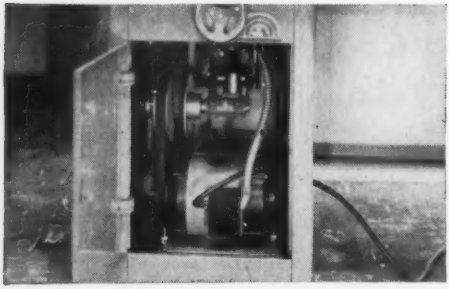
...With Quality Features Found In No Other Lathe *At Any Price!*



EXCLUSIVE DRIVE SELECTOR. Only Delta lets you shift to all four speeds *simply by moving selector lever.*



CHOICE OF SPINDLE NOSE. Only Delta gives you choice of modern or conventional Spindle Nose *at no extra cost.*



PERFECTED VARIABLE-SPEED DRIVE. Only Delta has choice of speeds from 45 to 1550 rpm, *plus* matched V-Belts.

SEEING IS BELIEVING...

Send the coupon for the name of the Delta Dealer nearest you who has this new lathe development on display and available for immediate delivery.

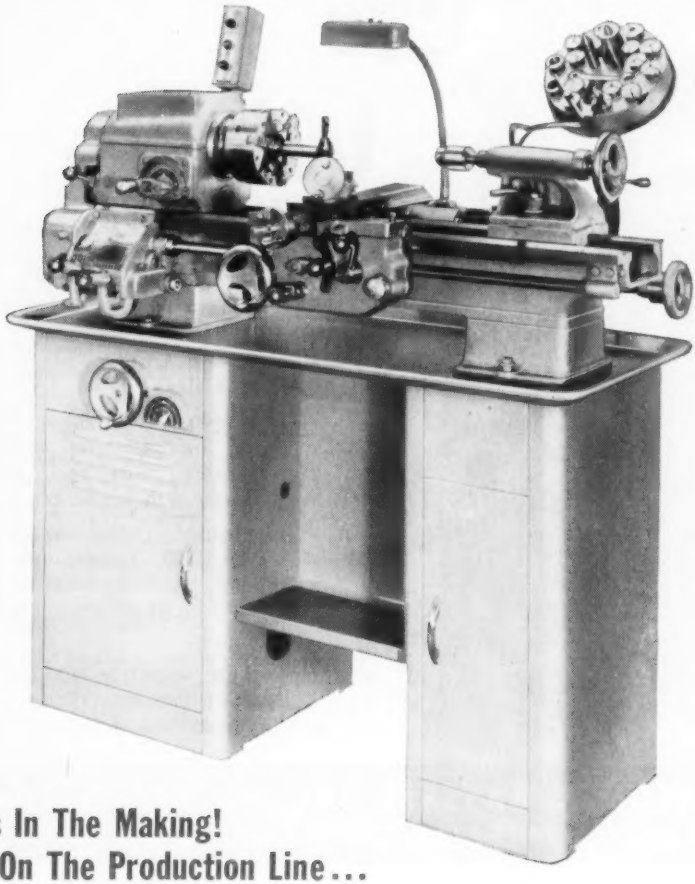
DELTA ROCKWELL **DELTA** QUALITY POWER TOOLS

Another Product by **Rockwell**

ROCKWELL

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DELTA Metal Cutting Lathe



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DELTA 11" METAL CUTTING LATHE. Cabinet model. Variable speed drive with 24" capacity center to center, and 1" collet capacity. Diameter of hole through spindle, 1 3/8". Full line of accessories available. Send coupon for complete information.

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FROM J&B



1. 4-PURPOSE PRECISION PANTOGRAPH

The *"Panto-Miller"*

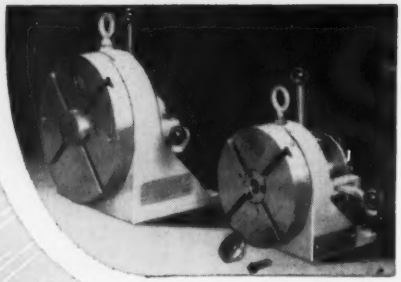
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JOHNSON & BASSETT, INC. *Production Tool Div.*
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2. RAPID, ACCURATE JIG POSITIONING

This indexing trunnion, with station selector, accurately holds and locates either jig or work. SIMPLIFIES JIGS. REDUCES SET-UP TIME.

Ask for "TRUNNION" information

Holes, Contours, Surfaces

Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Co., Inc., 730 Union Ave., Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Crush Wheel Dressers, Precision Rotary Tables, Motorized Centers and a complete line of Hole Location Accessories.

7 Tricks of the Trade in Jig Grinding Small Holes

The following tricks of the trade will prove helpful in jig grinding small holes with a diamond-charged mandrel:

1. Uniformly graded diamond powder should be used for charging mandrels. Holes from minimum (1/64″) to about 3/32″ in diameter should be roughed and finished with 80-100 grit powder. Larger holes may be roughed somewhat more rapidly with a coarser grade, 60-80 grit.

2. Avoid bellmouth by preventing the mandrel from leaving the hole at either end.

3. Since a freshly charged mandrel will cut much more rapidly than a worn one, avoid introducing a freshly charged tool as a hole nears size, Fig. 1.

4. Do not permit the uncharged *shank* of a mandrel to contact the surface being ground. Frictional heat will burn both the work and the mandrel. The former, partially annealed at point of such contact, will charge with diamond sut and probably be ruined.

5. It is generally more economical and efficient to consider mandrels as expendable and make a new one for each job. Since the cost is only a few cents, use of an old one, or even the time spent trying to match one to requirements, is hardly justified.

6 Because mandrels cannot be trued with a diamond, it is necessary to measure both the top and bottom of a hole while grinding, in order to avoid a ridge.

7. In view of point 6, it is advisable to set the work up on parallels of sufficient height to enable measurement from beneath the workpiece, Fig. 2.

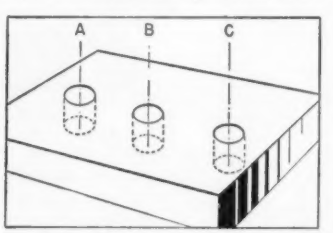


Fig. 1. In grinding three holes to size, A and B are roughed to within .001″–.002″, and C within about .005″. Using a freshly charged mandrel, C is finished to size, thereby breaking down the high points on the tool. A and B may now be safely ground to size.

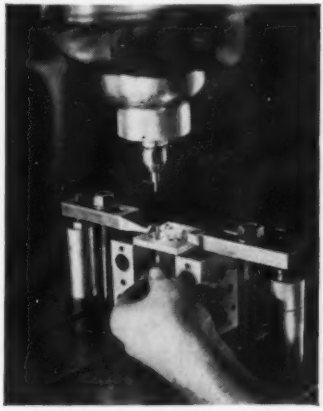


Fig. 2. Workpiece is mounted high enough to permit measuring bottom as well as top of hole.

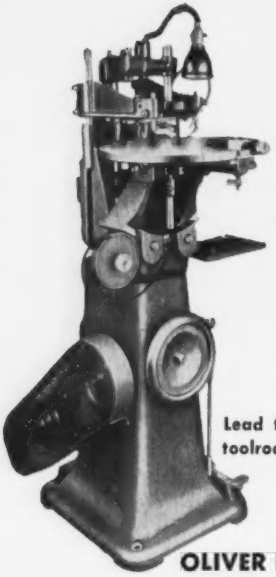
Get ALL the answers from this new, 424-page book

The information on this page is just a sample of the valuable, on-the-job aid you can get from Moore's *all-new* book, HOLES, CONTOURS AND SURFACES. Tells you how to produce tools, dies and precision parts *the modern way*. 424 pages, 495 illustrations. 184 pages of Woodworth Coordinate Location Tables from 3 to 100 holes. Price only $5 in U.S.A., $6 elsewhere. Send check or money order to Moore Special Tool Co., Inc., 730 Union Ave., Bridgeport 7, Conn.



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GET SMOOTHER TOOLROOM PRODUCTION
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Available in 5 Models



The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

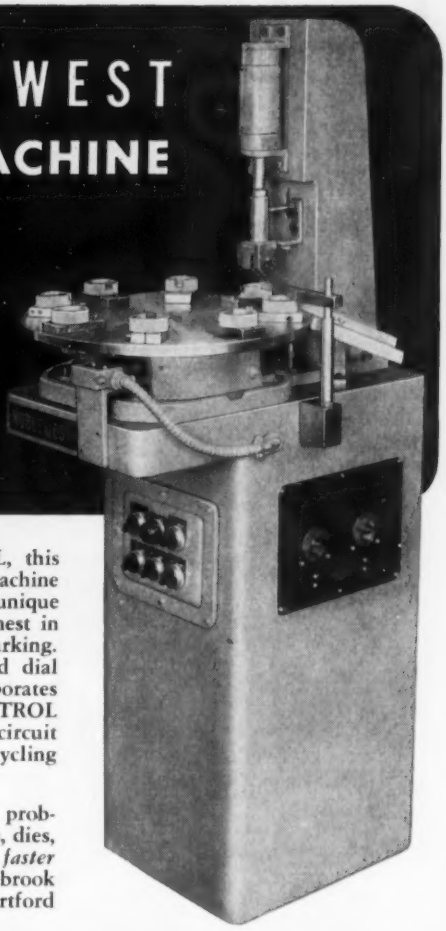
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air-marks
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Whatever your marking or numbering problem, NOBLEWEST makes the machines, dies, and fixtures for doing the job *better, faster* and at *lower cost.* Write Noble & Westbrook Mfg. Co., 25 Westbrook St., East Hartford 8, Connecticut.

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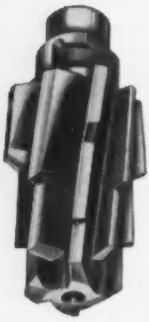
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Eclipse Radial Drive High Speed Steel Cutter bores 5 diameters in steel part.



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NUMBER TWO IN A SERIES

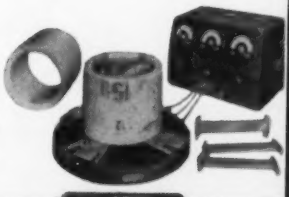
What's The Best Way To Gage These Parts?

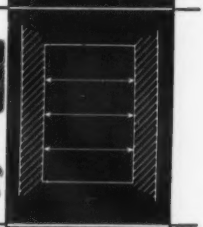
Tips from Taft-Peirce on when and where to use a T-P CompAIRator Air Gage



Three ID's
Tolerance: .120"

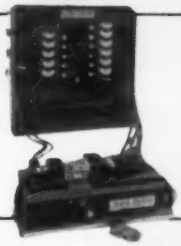
One three dial T-P CompAIRator Air Gage checks three ID's simultaneously on this asbestos cylinder. Only a T-P CompAIRator can check such wide tolerances. Versatile as well as sensitive, T-P CompAIRator equipment may be designed to check most any specific tolerance range from .0001" to .125". And most any dimension from simple ID's and OD's to complex tapers, barrel shapes, squareness or ovality.

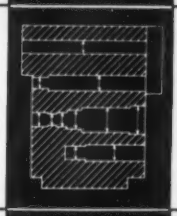




Eleven ID's
Tolerance: .001"

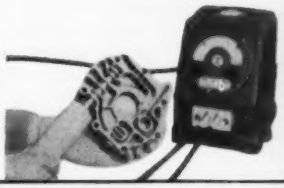
One eleven dial T-P Air Electric CompAIRator reduces inspection of 11 ID's on this valve body to a fraction of a second. Lights indicate any dimensions out of tolerance. Dials give exact readings of size. Savings in time alone paid for this unit in short order. Vibration, jarring, tilting won't disturb its accuracy.





Concentricity
Tolerance: .0002"

This T-P Computing CompAIRator indicates on one dial the total eccentricity between two diameters. Saves multiple measurements and a computation. An exclusive T-P development, Computing CompAIRators may also be used to speed and simplify such checks as center distance, taper, and squareness of bore-to-face.

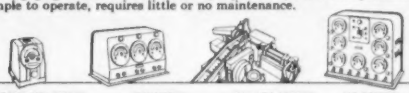




For more examples and the complete story on Taft-Peirce CompAIRator Air Gages send for Bulletin.

WHAT IS A COMPAIRATOR AIR GAGE?

A CompAIRator is a sensitive gaging instrument that measures variations in the velocity of tiny jets of air. When work is placed over these jets, air flow is restricted and its velocity reduced. Any change in air velocity reflects a change in part size, which is immediately shown on a calibrated indicator. Since only air contacts the part in most cases, there is minimum wear on gaging members. Fast, accurate, dependable, a T-P CompAIRator is simple to operate, requires little or no maintenance.



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T-P means Top Precision

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for that last hundred-thousandth

The VK LIGHT WAVE MICROMETER 0 to 3"



Catalog and Handbook No. 35

The Van Keuren Light Wave Micrometer is an instrument of exceptional accuracy, ideal for measuring plug gages or small precision parts. Use it when you're after "that last hundred thousandth" involved in so many of today's measurements. The 0 to 3" instrument shown above has a ½" diameter, 40 threads per inch micrometer screw, which can be made with greater accuracy, and which has 3 times the wearing surface of an ordinary micrometer screw. It has an 8" diameter micrometer wheel, with .0001" graduations 1/10" apart. It has a non-parallax vernier index which enables readings to be made to .00001". It has an index lock and carboloy-tipped anvil and spindle. This sturdy, sensitive instrument weighs only 17 pounds, and is in reality a portable measuring machine of inbuilt and sustained accuracy. The Light Wave Micrometer is not a comparator. No gage blocks are needed and no errors creep in from worn blocks. It is a direct source of dependable precision . . . fast, accurate and profitable.

This 220-page volume represents years of research by the Van Keuren Co. It presents a simple and exact method of measuring screws and worms with wires, tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods. Ask for your copy... sent free on request by writing: The Van Keuren Company, 175 Waltham St., Watertown, Mass.

VK 36th YEAR

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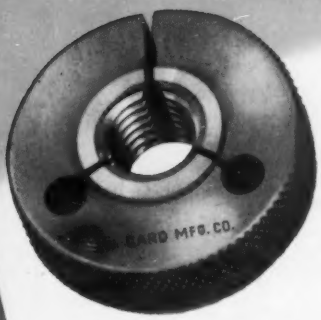
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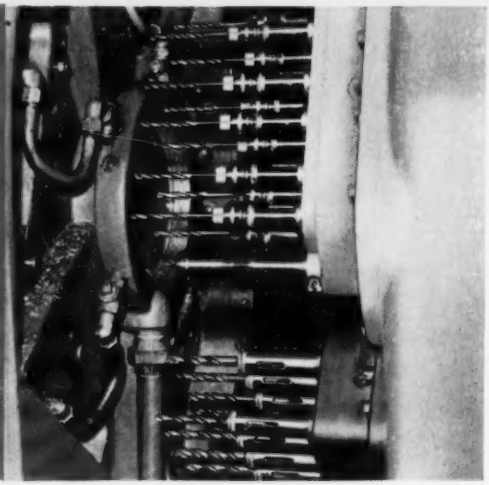
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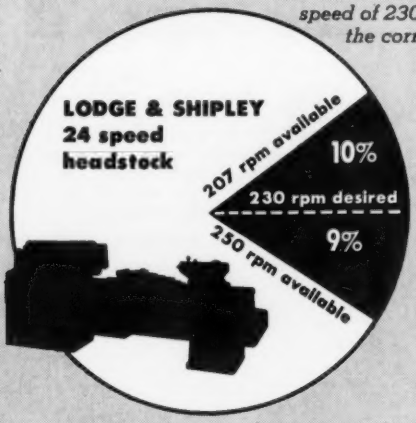
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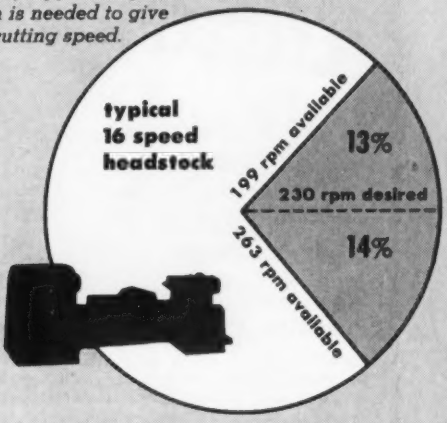
GET MORE PRECISE SELECTION of RIGHT CUTTING SPEEDS

with LODGE & SHIPLEY 24 SPEED HEADSTOCKS due to smaller speed increments over a wider range.

To illustrate our point, suppose a spindle speed of 230 rpm is needed to give the correct cutting speed.



On the Lodge & Shipley 16-inch, 24-speed Headstock, 207 and 250 rpm are available. Choosing 250 rpm gives a speed that's within 9% of the desired speed.



On a typical 16-inch, 16-speed Headstock, 199 and 263 rpm are available. Choosing 199 rpm gives a speed that's within 13% of the desired speed.

On these same lathes The Lodge & Shipley 24-speed Headstock also has a wider range—14 to 1160 rpm . . . compared to the typical 16-speed headstock's 16 to 697 rpm range.

Considering a new lathe? You'll find it well worth investigating the number of spindle speeds, the size of the speed increments and the range. The more speeds you have (up to a practical limit) and the smaller the increments between speeds . . . the more perfect choice of cutting speeds you can make. Insufficient spindle speeds severely limit your selection as indicated in the data above.

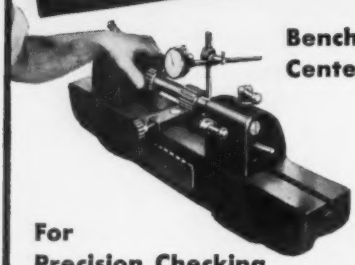
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Time Saving Production and Checking Accessories

Here are three Sundstrand accessories that may prove helpful in your work. A wide range of bench centers and balancing tools are available for checking purposes. The automatic index base has proved a sound addition to many metal working machines. Write for further information.



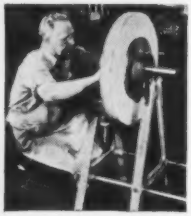
Bench Centers For Precision Checking

Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

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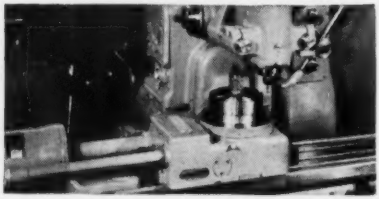
6" x 18"	12" x 48"	24" x 48"
6" x 36"	12" x 60"	24" x 60"
12" x 36"	12" x 72"	24" x 72"

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Sundstrand offers a complete line of balancing tools which will save their cost quickly on truing or balancing operations. Accurately sensitive and durable, they provide a simple, reliable means for checking the balance of parts like gears shafts, fly wheels, pulleys, etc. Standard swing sizes range from 21 inches up to any swing desired. Length between standards ranges from 20 inches to any length desired.

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This automatic index base is designed so there is no strain against the index plunger during the cut. The base is locked by powerful clamping so that accuracy of index is not affected by heavy cuts.

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Free Data

Complete specifications are available on these three time saving accessories. Write for your copies **today.** Ask for bulletin 555



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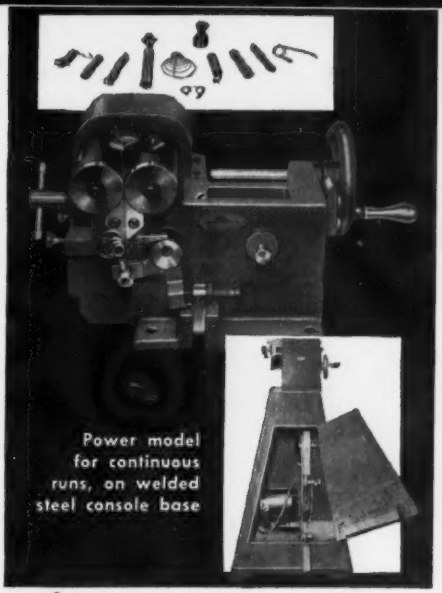
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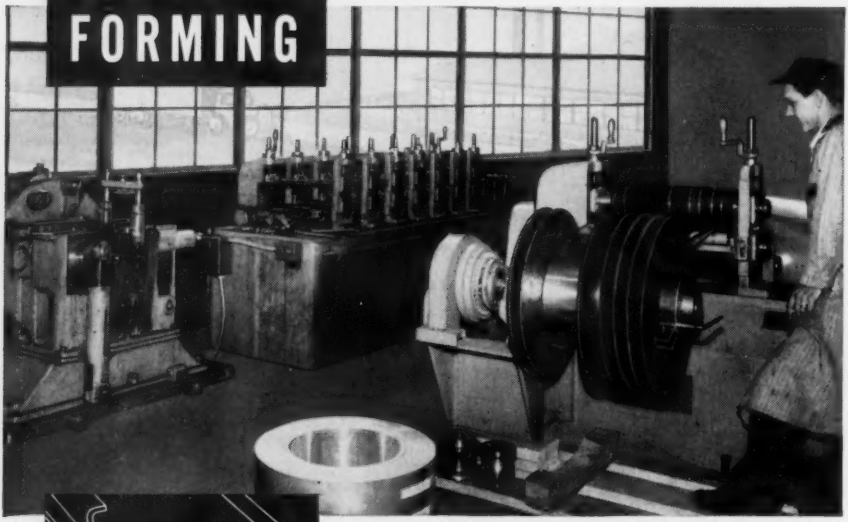
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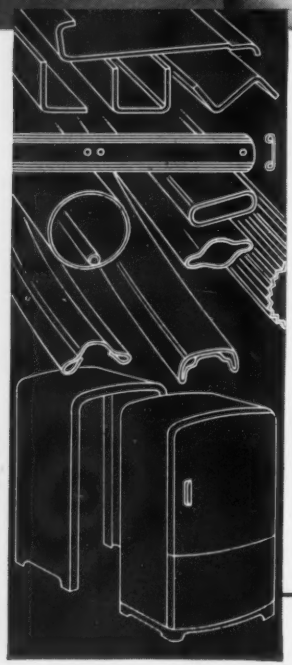
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The Yoder Book on Cold-Roll Forming is an illustrated treatise on the art, the machines and many of the things they can do to reduce cost and increase production. A copy is yours for the asking. Consultations and estimates without cost or obligation.

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7 benefits received by switch to
STANOSTAMP Compound C

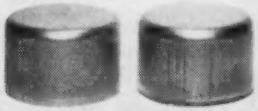
Jagemann Stamping Company, Manitowoc, Wisconsin, benefited seven ways by switching to STANOSTAMP Compound C. Finished ferrules drawn from 19 gauge cold roll steel were being badly scored. At the same time dies were being scratched and excessive heat experienced in the press. Standard lubrication specialist R. E. O'Brien suggested STANOSTAMP. The result:

1. Production increased 20%
2. Die maintenance reduced 30%
3. Spoilage reduced
4. Finish improved
5. Galling minimized
6. Cooler machine operation
7. Washability improved

STANOSTAMP Compound C is a water emulsifiable paste for heavy drawing operations. It contains an inert, non-abrasive mineral filler for protection of dies and work, is readily cleaned from work in conventional washing equipment. In the Midwest, your nearby Standard Oil lubrication specialist will be glad to tell you more about STANOSTAMP. Call him. Or contact: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.



Father and son inspect ferrules. William P. Jagemann (left), President, and son William T. Jagemann note improved finish on work using STANOSTAMP.



Air hose ferrules. One at right produced before switch to STANOSTAMP, one at left produced after conversion to this forming compound. Scoring of dies as well as work occurred before switch.

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STANDARD



Over the Editor's Desk

RESPONSE

We were hardly prepared for the overwhelming number of letters received in response to the new format and layout unveiled in the March issue. Actually, it seemed that no sooner had the first copies of the issue been put into envelopes and dropped into the mail that we were receiving notes, letters, and even phone calls telling us that the changes in style and presentation had been noted. For all of your comments — your complimentary remarks and expressions of approval as well as your helpful suggestions for further improvement — we are indeed grateful.

To those who expressed interest in the man whose suggestions we followed in the selection of type faces, page layout, and so on, he is George Samerjan, a magazine design consultant with office and studio in New York City.

Not only in appearance does *Modern Machine Shop* lay its claim of being truly modern but also in data and information which, as always, is the latest and best on metalworking practice.

PLAN NOW

It's not at all too early to begin planning right now to attend the Machine Tool Show and the Production Engineering Show to be held concurrently in Chicago, September 6 through 16. With nearly 100,000 manufacturing executives from every industry in the world expected to attend these two gigantic shows, accommodations may not be available for those who wait until the last minute. Make your hotel reservations now.

★ ★ ★

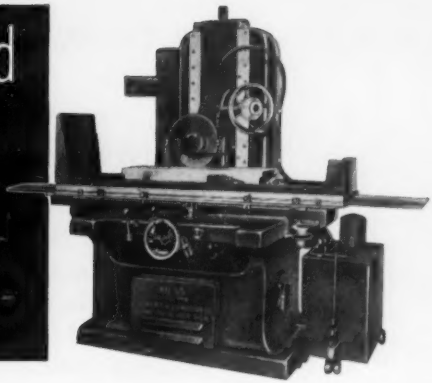
OPEN WINDOWS

In our travels about the country, we have noticed that the companies which permit "outsiders" to come in to see the operations being performed in their plants are frequently the ones which profit most from the exchange of ideas and information. More graphically expressed, when a plant opens its windows, more light seems to shine in than shines out.

A technical magazine such as *Modern Machine Shop* is edited primarily to help shed light on baffling production problems. We try to pack as much solid, helpful information between the covers of each issue as we can. This information is helpful only in so far as it is read, digested, and then used in the solution of production problems.

When you have finished reading your copy of *Modern Machine Shop*, why not pass it around to others in your department? Those who work for or with you and respect your judgment of reading material will appreciate this courteous gesture.

When the need is for SPEED and PRECISION



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VOL. 27, NO. 11 APRIL, 1955

FEATURES IN THIS ISSUE

"CONVEYORIZED ASSEMBLY SUPPLY"
By Gilbert C. Close

This article deals with the efficient conveyorized systems in use at the General Electric Company's huge Ontario, California, plant where electric flatirons are produced. According to the author, the materials handling systems described in the article are among the most carefully planned and well integrated conveyorized production systems he has ever encountered. Page 105.

SHIFTING ELEMENTS FOR MACHINERY, PART I • *By Fred Rogers*

The author discusses the various types of shifting rollers, shoes, yokes and rings, their design, means of retention, dimensional tolerances, and the different materials and heat treatments used for them. Numerous sketches showing the different shifting elements are included in the article, the second part of which will be published in the next issue of this magazine. Page 114.

HOW TO MACHINE STAINLESS STEELS WITH BOX TOOLS • *By G. J. Stevens*

The discussion covers briefly some of the best box-tool setup practices for turning stainless steels and illustrates how certain problems are solved. In all, eight recommended box-tool setups for the efficient turning of stainless steels are mentioned in this "how-to-do-it" article. Page 128.

MILLING WITH HELICAL CARBIDE MILLING CUTTERS • ***By R. L. Stevens***

The purpose of this article is to help educate mill operators in the proper use of helical carbide milling cutters. The discussion covers several considerations essential to the proper application of such tools; namely, rigidity, horsepower, speeds and feeds, the chip, finish, and the operator. Page 134.

EMPLOYEES CAN IMPROVE PUBLIC RELATIONS • ***By Alfred M. Cooper***

The author discusses in an interesting and thorough manner a method of securing complete employee cooperation in improving the public relations of any plant or industry. Executives and shop or office employees alike should find this article extremely helpful. Page 144.

FEATURES IN THIS ISSUE

★ ★ ★ ★ ★

Features In Next Issue

PRACTICAL METHODS OF STEELS IDENTIFICATION • ***By Howard E. Boyer***

The information to be presented in this article is particularly applicable to those shops where diversified manufacturing operations are performed and where problems revolving around mixed steels tend to become sizable.

HIDDEN-ARC WELDING IMPROVES REEL DESIGN

This report, based on a Mechanical Design Competition award paper, will cover both an interesting design and clever fabricating angle employed in producing large dresser reels for the textile industry.

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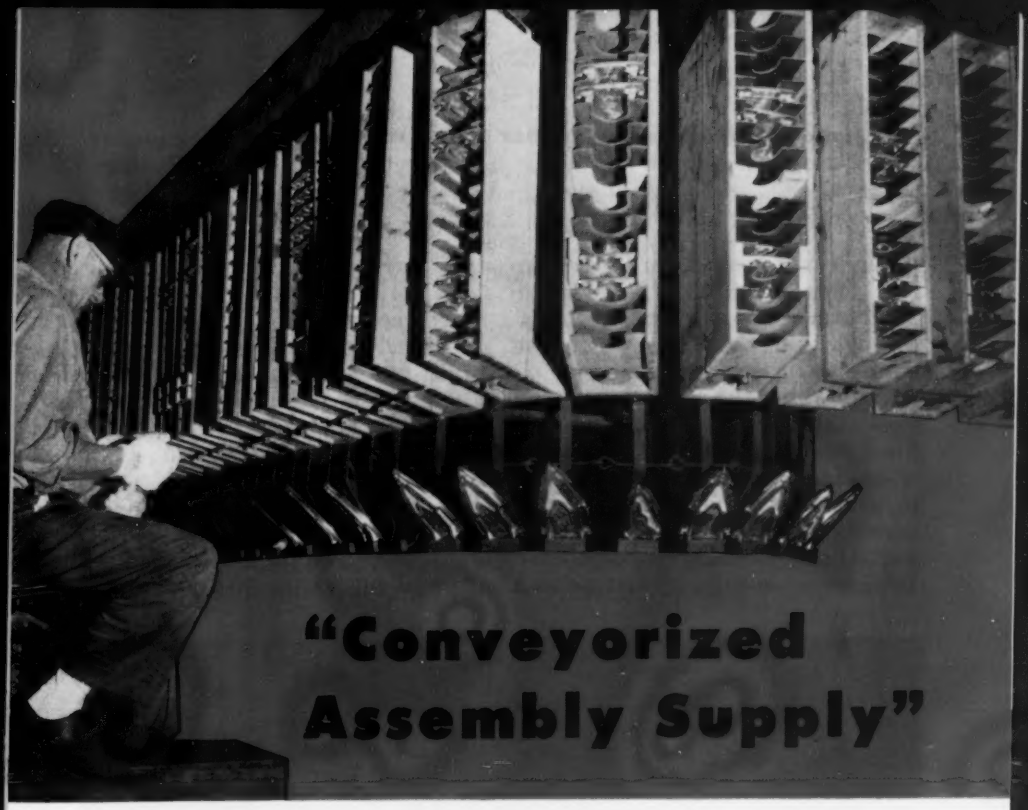
Specify ARMSTRONG Wrenches for lifetime service, for finely balanced tools that feel right in the hand and make work easier, faster and less fatiguing. ARMSTRONG Wrenches generally are longer for size—give greater leverage. Accurately milled or broached openings give the proper clearance. They are safe wrenches because they are strong beyond need.

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"Conveyorized Assembly Supply"

This article deals with the efficient conveyorization systems in use at General Electric's Ontario, California, electric flatiron plant.

By GILBERT C. CLOSE

When a worker on the assembly line at General Electric Company's huge, Ontario, California, plant needs another part for the electric iron he is helping to assemble, he merely reaches for and selects it from one of the 600 conveyor pockets or pigeonholes that pass his work station every minute during the working day. While he is installing the part, hundreds more just like it will drift past him in the pigeonholed carriers on the conveyor chain. But this doesn't bother him at all. He knows he isn't "falling behind." Each part will travel the con-

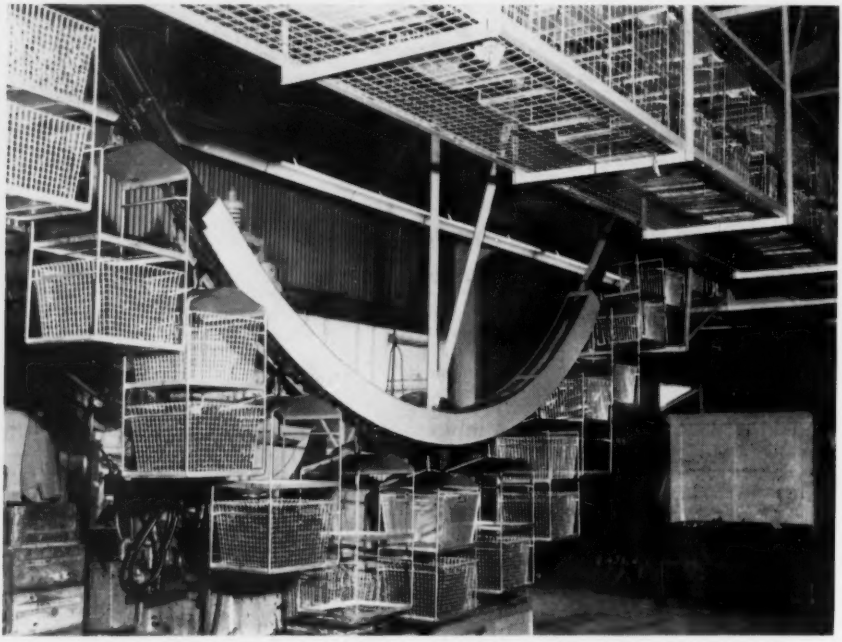
(Above) The inspector must handle every iron soleplate that passes this point, as he must transfer them from the lower conveyor into the pigeon-holed conveyor carriers above.

". . . when he reaches for another part it will be there. There's no lost motion . . ."

veyor circuit and return . . . again and again if necessary. The main point is, when he reaches for another part it will be there. There's no lost motion — no waiting for parts.

Meanwhile, the floor around his work station is entirely free of half-filled boxes and tumbled stockpiles of waiting parts. No truck-and-trailer trains thread the aisles. When the assemblerer has finished with his particular operation, he doesn't lay the part aside to be picked up and transported onward in the indefinite future. He merely places it on another conveyor where it goes silently and steadily on its way to the next work station.

Officials at General Electric have coined an apt name for the quiet efficiency of this operation . . . They call it a "conveyorized assembly supply." This terminology applies very well to the end purpose of the installation. But it fails to reveal the planned intricacies of a plant-wide

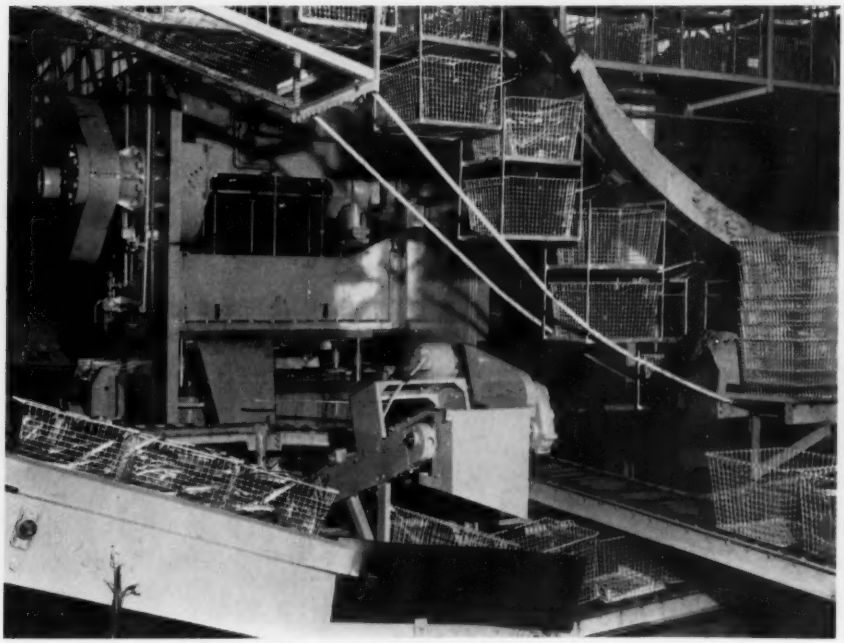


Here, in one of the detail parts production sections, a basket conveyor system dips down to permit easy loading. This conveyor eventually delivers its parts to the final assembly line.

conveyorization setup that not only results in a conveyorized assembly supply, but that transports every part through every move from its raw stock stage until it becomes a component in a finished electric iron, boxed and ready for shipment to the customer.

In this west coast General Electric plant, where all of the company's electric irons are produced, conveyorization has been engineered to a new high in utility. In fact, conveyorization and production are so integrally interwoven that it would be impossible to draw a demarcation line between them. This is because when a specific conveyor is used to transport parts from one production operation to the next, the same conveyor may serve as an unloading platform for the first machine while it automatically loads the parts into the receiving end of the next production machine.

Nearly two miles — 8,833 feet, to be exact — of overhead conveyor chains thread the production and assembly areas. The overhead conveyors are supplemented by numerous separate belt conveyors used to span short gaps, to load or unload machines, or to carry the work through the various machines. When fully loaded, the various conveyor systems contain more than 100,000



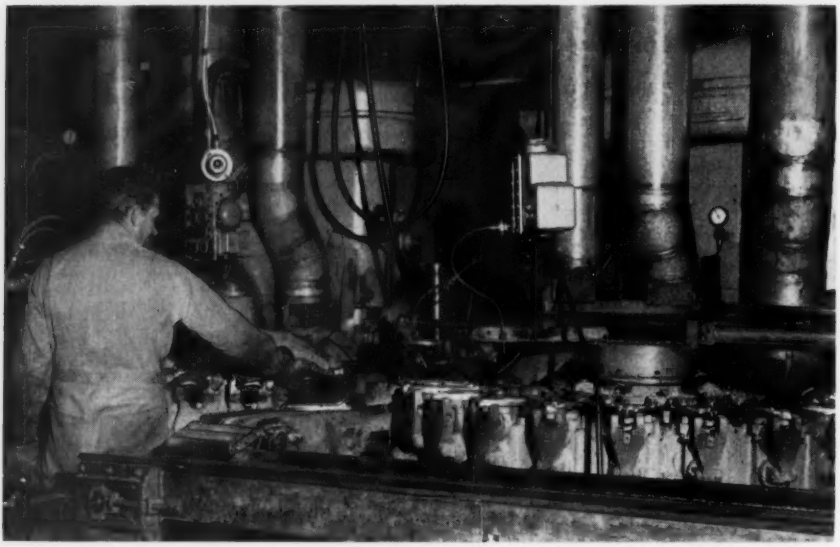
The heavy power press shown in the background delivers its output (via a short belt type conveyor) into baskets for loading on the basket conveyor system.

". . . tremendous conveyor capacity makes it unnecessary to stockpile parts anywhere along the production line."

major electric iron parts, plus nearly 3,000 conveyor baskets filled with detail parts too small for individual conveyor suspension.

The tremendous conveyor capacity serves two major and very useful purposes. First, when operations are normal, the conveyor systems are kept loaded with a full day's supply of iron parts. Thus, in effect, the conveyors are operating 24 hours ahead of the assembly division. This is a safety measure — a stop-gap to accidental production delays. If anything goes wrong in the foundry, the heavy press division, or in the detail parts production section, there are enough parts on the conveyors to keep the assembly line in operation for 24 hours. In most cases, the interruption which has occurred can be remedied long before this interval has expired.

Secondly, this tremendous conveyor capacity makes it unnecessary to stockpile parts anywhere along the production line. When a foundry operation, a machine operation, a finishing operation, an inspection, or a subassembly operation is completed on any part, that part is immediately placed upon the conveyor



In this view, a multiple-head face milling machine which is equipped with five mills is used to finish iron soleplates and then unloads them onto a short belt type conveyor which carries the iron soleplates to the next production operation.

and is transported to the next operation. If, when it reaches the next operation, it cannot be accommodated at the time, it is merely left on the conveyor until "the next time around." From the time it is produced (in the foundry, in the heavy press section, or in the detail parts section), until it is incorporated in an electric iron ready for shipment, each part is either on a conveyor or is being processed or worked upon in some particular machine.

The plant-wide conveyorization setup includes six major overhead conveyors. One conveyor originates in the machining department and transports cast parts (mainly iron soleplates) through the machining and finishing departments to the assembly section. This conveyor is 1,450 feet long. Another major conveyor originates in the heavy press division where iron tops and other major parts are stamped out. This chain, 1,195 feet in length, transports the heavy press parts to the finishing departments, where they are picked up by another conveyor, 1,520 feet in length, and transported to the assembly section.

A fourth conveyor, hung with two baskets on each hanger (2,960 baskets in all), is 2,960 feet in length, travels the length of the plant from the foundries to the assembly division, and is used for transporting a miscellaney of small parts segregated in the different baskets.

The fifth and sixth major conveyors are called "re-work" conveyors and are used to transport all parts which for some reason demand additional attention before they are installed on the iron. One of these rework conveyors handles soleplates; the other iron tops. Parts for the rework conveyors usually originate at various inspection stations. Parts on the rework conveyors, like the parts on the assembly supply conveyors, are segregatd in the pigeonholed conveyor carriers according to the type of rework required. These conveyors retrace the various stations where the rework is accomplished. After rework, the part is replaced on an assembly supply conveyor. In practically all places where work must be transferred from one conveyor to another, the two conveyors parallel each other at that particular point.

The pigeonholed conveyor carriers contain up to 15 compartments or pockets each. Conveyor

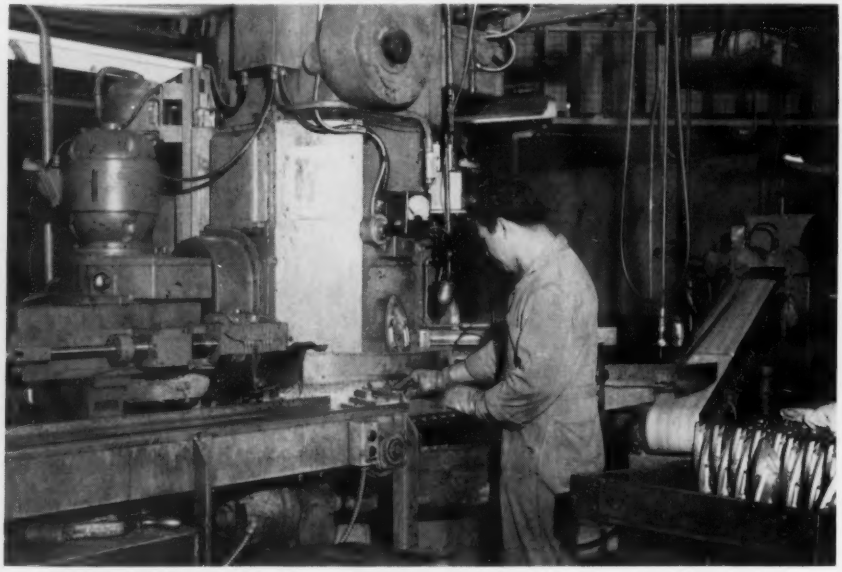


Iron tops in pigeonholed conveyor carriers pass punch press work station. Operator selects tops from pigeonholes as needed.

". . . there are ideas behind such installations which can be applied . . . to similar systems in other plants."

speed is adjusted so that about 600 of these compartments pass each work station in the course of a minute. The compartments are color-coded separately or in combination for specific parts on the assembly conveyors and for specific types of rework on the rework conveyors. Thus, the conveyor carrier pockets passing any one work station will contain a lot of work not intended for that particular station. However, the coding and indexing of conveyor carrier pockets has been perfected along different portions of the conveyor lines until any employee can become familiar with it in a short time and no confusion exists.

Attempting to trace each conveyor used in the plant, and detailing the specific functions of each, is far beyond the scope of this article. Nor would such detailed information serve a worthwhile purpose. Any comprehensive conveyor system must be modified to meet existing production conditions in the plant where it is installed. But there are incentives or "ideas" behind any such installation which can be applied, perhaps with some modifica-



Soleplates arrive on the belt conveyor shown at the left for automatically drilling and lapping. After drilling and lapping, the soleplates continue onward on the belt type conveyor which is shown at the far right in this illustration.

tion, to similar systems in other plants. The illustrations with this article, along with the captions of each, call attention to many of these "ideas" which, with some imagination and modification, can be applied to other conveyor systems handling a different type of product.

As already mentioned, a completely conveyorized assembly supply is the end-purpose of General Electric's conveyorized setup. But in working toward this goal, plant engineers noted and took advantage of other innovations to improve the general efficiency of the entire system.

One hundred per cent inspection of all parts is assured at various points along the line by making it necessary for the inspector to remove each part from one conveyor and place it upon another. By employing smaller belt conveyors between machines along the line, parts in process are kept constantly on the move without interval stockpiling and storage. When possible, these short conveyors are used for both unloading the first machine and loading the second.

The rework conveyors serve several functions. They not only return defective parts for rework, but segregate the parts (via the pigeonholed conveyor carriers) for specific types of rework. At certain work stations, the rework conveyors provide an auxiliary source of parts in addition



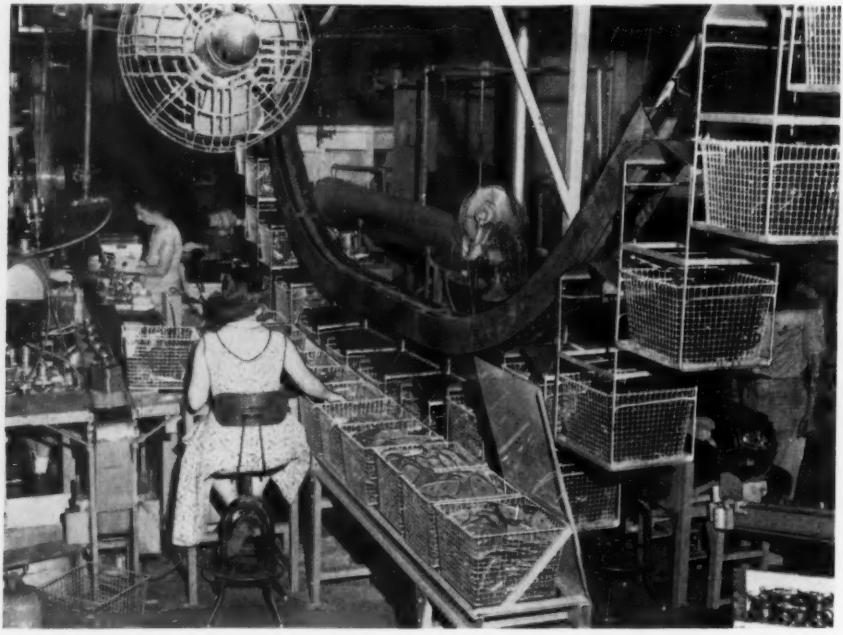
Here pigeonholed iron tops, segregated by code colors, arrive at the final assembly line. The carriers are not emptied as they pass the work station—only needed parts are removed. Other parts will be removed the "next time around."

"The entire system is designed to keep a constant supply of parts passing each work station . . ."

to the parts being carried on the main supply conveyors.

The entire system is designed and installed to keep a constant supply of the required parts passing each work station at all times, whether this happens to be an assembly work station, or a work station contributing to the initial production of the part. Furthermore, by carefully planned routing, the conveyors make full use of specific types of plant equipment. As an example of this, conveyors from several production sections use the same metal cleaning facilities for the parts they are transporting, thus avoiding the necessity of duplicate cleaning installations. The same technique is used at various inspection stations where a number of different parts congregate (via conveyors) for the purpose of inspection and then loading on a single conveyor which carries them on their way.

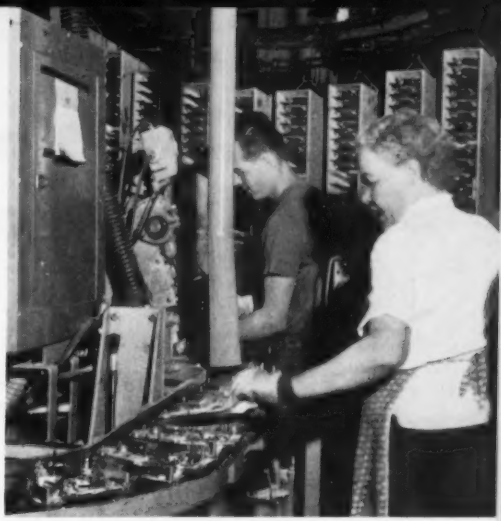
As might be expected, a sudden



In this view, the basket conveyor is shown in the process of delivering its parts to the final assembly division in the General Electric Company's huge plant in Ontario, California.

convergence of work at any one work or transfer station may cause a temporary overload. To help out in these emergencies, "floating employees" are used. These employees may be maintenance men or serve another purpose in the normal routine of their work, but they are subject to call to any specific work station when additional help is required.

Suffice it to say that when the assembly employee reaches for a part drifting by him on the conveyor line, that part didn't appear where it is by accident. It is there only because of one of the most carefully planned and well integrated conveyorized production systems this writer has ever encountered.



Iron subassemblies arrive via pigeonholed conveyor carriers and are transferred to the final assembly line conveyor (located on table at the lower left of the illustration).

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Magnetic Control of Industrial Motors. Second Edition. By Gerhart W. Heumann. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 714 pages. Cloth binding, board covers. Price, $9.50.

A complete reference to the principles of motor performance, controller and circuit design and controller application, this book has been revised to keep up with recent progress in the design of control components and systems and other advances in this electrical art. New material is therefore included on adjustable voltage and regulating systems, with particular reference to rotating and magnetic amplifiers. In the modernized reference material, the theoretical background that underlies recognized National Standards and Safety Codes is emphasized. Illustrations have been changed accordingly to show modern design and construction.

Since the performance of control equipment is based on the desired motor performance, special care has been taken to discuss the external performance characteristics of all types of industrial motors. A study of the components and devices available to the control designer and basic circuits which obtain the motor performance required for industrial drives are also included. The practical combinations that can be derived from these building blocks are illustrated by a survey of widely used general and special purpose controllers. As a guide to industrial engineers, the volume is said to allow for the proper selection of a controller for any given motor application.

Shifting Elements For Machinery
Part I

This article discusses the various types of shifting rollers, shoes, yokes and rings, their design, means of retention, dimensional tolerances, and the different materials and heat treatments used for them.

By FRED ROGERS

The movement of the sliding gear, the positive and the friction clutch, the hydraulic valve mechanism, and the index plunger or lock bolt is in a large degree dependent upon some form of shifting shoe, roller, ring, or yoke. Add to this the manipulation of square and dovetail slides, sleeves, rods, bars, levers, collet chucks, automatic threading equipment and mechanical work loaders and work ejectors, and it becomes evident that the shifting element assumes importance in the operation of machinery and other mechanical contrivances. This article discusses the various types of shifting elements, their design, means of retention, dimensional tolerances, and the different materials and heat treatments used for them.

The simplest type of shifting ele-

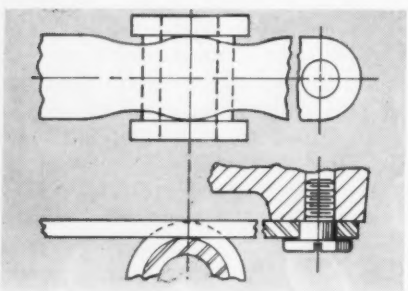


Fig. 1—The simplest type of shifting element comprises a rectangular steel bar, as shown in this sketch.

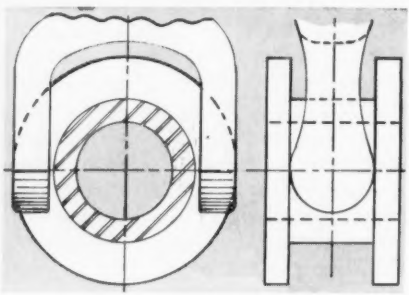


Fig. 2—The design shown in this sketch provides an economical method of shifting machinery.

ment comprises a rectangular steel bar, as shown in Fig. 1. This bar is radiused on either side of its width, as shown in the upper view, and contacts the flanges of the movable spool. Because the bar is but a single plane, engagement with the spool is on one side only. The bar is pivoted on a shouldered screw at the right and, although not shown, the handle end of the shifting lever rests in a slot of the housing wall suitably supported.

In one instance, the upper side of the lever was drill spotted to accommodate a rounded spring detent, not only to position the spool in its extreme positions but also to properly hold the lever in contact with the spool flanges. The thickness of the lever and the depth of the flanges are approximately the same dimension, as illustrated. This design is for light work only, the shifting and engaging loads of which are inconsequential, as well as the fits of the parts on the free side. In this arrangement, plain cold drawn rectangular steel stock was used for the lever and left in its natural state; that is, without heat treatment.

It is generally regarded as of sound design principles to make contact between the shoes and the spool on opposite sides of the circle; namely, 180 degrees apart. In fact, numerous designs in this article show complete 360-degree contact. But there are also occasions when the shifting element, while having greater contact than is shown in Fig. 1, move the sliding piece from only one side which is also considered proper and adequate from a design standpoint. All three types are discussed in this article.

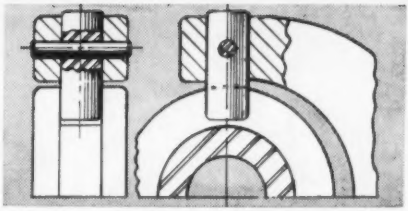


Fig. 3—This design illustrates a method of shifting with the aid of two diametrically placed pins in a yoke.

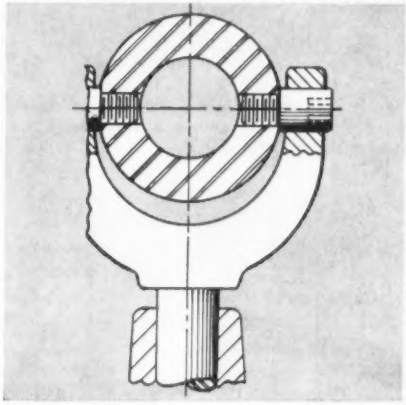


Fig. 4—The movable sleeve in this yoke design is moved by pins assembled after yoke is in place.

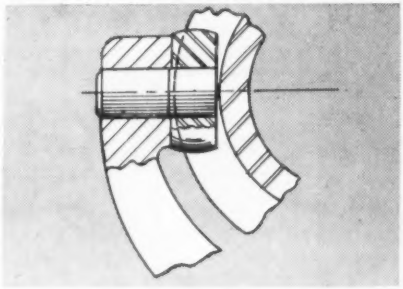


Fig. 5—Slippage and consequent wear can be eliminated by finishing the outer surface of the roller on a radius.

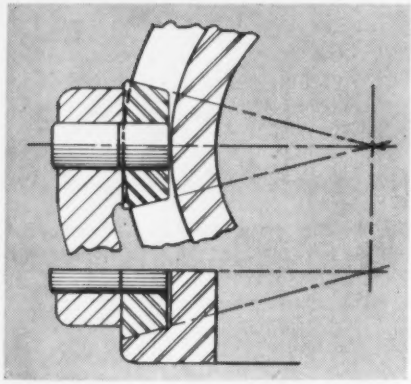


Fig. 6—For comparatively heavy end loads, the design of roller shown in this sketch has been found satisfactory.

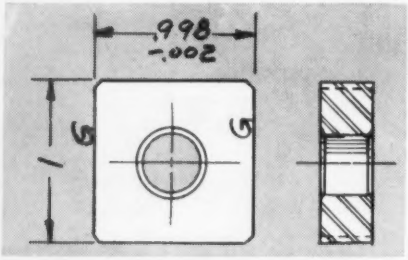


Fig. 7—This sketch illustrates the square type of block shoe used frequently for shifting gears and clutches.

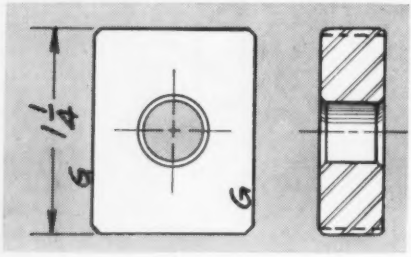


Fig. 8—This block shoe has been modified by making the length ¼ inch longer than the width.

"The longer the movement the more circular the surfaces."

Of the first category mentioned above, the design shown in Fig. 2 provides an inexpensive method of shifting. The lever is forked with ends rounded and dressed with a file on the contacting surfaces. The lever is a steel casting and the ends are case carburized and heat treated. The spool is made of cold drawn steel. The longer the movement of the spool, the more circular should be the contacting surfaces. The design shown in Fig. 1 is for shorter movement than that illustrated in Fig. 2.

Although not illustrated, a round shaft has been milled on opposite sides with an over-and-over cutter located perpendicular to the shaft axis. Such a cut leaves four shoulders against which a forked lever, as shown in Fig. 2, bears. The lever ends are rounded and fit loosely into the slots in the shaft. A hydraulic piston rod as small as 1 inch in diameter can be so slotted. In this instance, the slots can be as much as 5/16 inch deep per side, which is sufficient contact for light duty work.

In some forms of chucks which are operated from the rear of the spindle, the ends of the ratio-arms which operate the jaws are rounded off similarly and fit into slots in the back of the jaw and also into the operating rod. The center rod of an air valve has been observed to be operated by a ball-ended hand lever. This ball-end fits into a drilled hole machined perpendicular to the spindle and is of sufficient depth to al-

low end movement of the rounded lever arm as the lever swings through its arc.

Shifting with the aid of two diametrically placed pins in a yoke is another inexpensive assembly if the loads are light and wear is not a factor of design. In Fig. 3, the pins are pressed into the yoke and, in turn, are held with another smaller pin. The shifting pins can be made of screw stock and cyanided but the holes in the yoke must be reamed undersize. In the event that hardened pins can be purchased which are ground a few tenths oversize to very close tolerance, these standard commercial pins will be found very satisfactory. The smaller retaining pin may be dispensed with as the shifting pins press into a standard reamed hole with sufficient interference fit. The space between the spool flanges is made approximately plus 0.005 inch over the pin and the flange surface may also be hardened. This arrangement is also applicable for light loads. Lubrication is effected by means of grease smeared on the flanges.

The movable sleeve shown in Fig. 4 is also moved by pins but these are assembled differently than in Fig. 3. They are actually socket head shouldered screws, assembled after the yoke is in place. The shifter yoke is reamed in the ears for a running fit of the pins. The lower end of the yoke is ground to provide a sliding fit in the shifting lever. As the yoke passes center, the rod end will slide upward in the lever hole, since the center of the sleeve is constant and does not move out of its horizontal plane. Such a sliding yoke

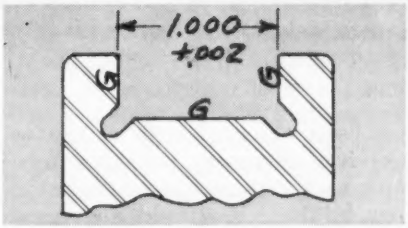


Fig. 9—This cross-sectional sketch shows the side walls of a spool designed for machinery.

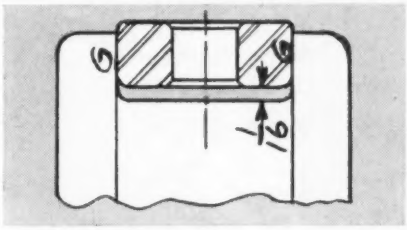


Fig. 10—If 1/16-inch clearance is permissible between elements, the corners left by turning tool can remain rounded.

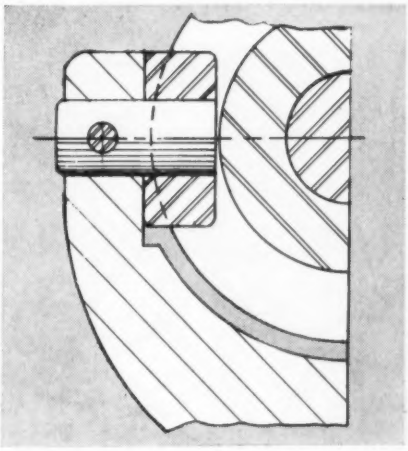


Fig. 11—The pin upon which the shoe rides and pivots in this design is a one-diameter pin.

"For heavier work . . . rollers are used extensively as the shifting medium."

has been observed with a key to keep it in alignment, but this will be unnecessary in most instances as the pins in the sleeve hold alignment satisfactorily, especially if the fit between the various components is kept within good commercial tolerances.

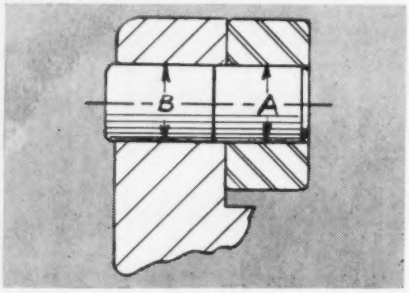


Fig. 12—The pin shown in this sketch has two diameters to provide a running and a press fit.

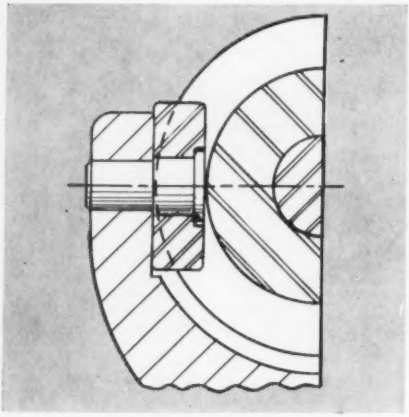


Fig. 13—This design prevents shoe from falling off its pin in assemblying yoke with its two required shoes.

For heavier work where so-called friction-free shifting effort is supposed to exist, rollers are used extensively as the shifting medium. Flat face rollers, or perhaps "flat periphery" would be more expressive, are in evidence in some contrivances for moving various mechanisms but in many instances this type of roller should not be used. Regardless of size, the surface speed of the flange will increase from its center outward, so that it is evident that slippage must take place on the periphery of the roller. This slippage and consequent wear can be eliminated by finishing the outer surface of the roller on a radius, as indicated in Fig. 5. This radius is equal to half the outside diameter of the roller. To state this in another way, the roller is nothing but a ball flattened by milling each side, like straddle milling. For heavy duty installations, some machine designers would criticize the high unit stress on the roller periphery. Under load the area of contact would assume the shape of a small ellipse. However, such shaped rollers are successfully used and can be frequently seen on shifting yokes.

In the assembly shown in Fig. 5, the roller is made of tool steel and hardened to approximately 62 Rockwell C scale. The pin, made of the same material with the same heat treatment, is ground to two diameters, one for a press fit into the yoke

bosses and the other for a good running fit in the roller. In this assembly, the roller contacts a single flange "spool" so that assembly and disassembly present no problem. However, if this type of construction is used to roll between two flanges of a spool, then the pin must be made removable. It could be assembled but not disassembled unless the yoke and spool can be assembled into the mechanism simultaneously.

For comparatively heavy end loads, the design of roller shown in Fig. 6 will be found to be more satisfactory. The roller is tapered, the apex of which falls on the center of the shaft. In this assembly as in the preceding example, the roller bears against but one flange. This flange must be faced at the same angle as the roller, as illustrated in the lower view of Fig. 6. Theoretically, this roller will not slip even though it has a bearing for its entire width. It will be obvious that peripheral speeds at various points along the outer face of the roller will equal those of the rotating flange at the same given points. The pin is ground the same as in Fig. 5 and material and heat treatment are the same. When under load, the area of contact assumes the shape of a rectangle even though theoretically the roller has but a line contact. This design is not satisfactory regarding unit load, wear, and general operation conditions. In both Figs. 5 and 6, the flanged member must be equally as hard as the pin and roller.

Square and rectangularly shaped block shoes are used frequently for the shifting of gears and clutches. This block type of shoe is centered on individual pins or studs and differs somewhat from the shoe with integral pin. In Fig. 7 is illustrated the square type which may be shaped in several ways. The simplest method is perhaps by using square cold drawn steel of .15 or .20 per

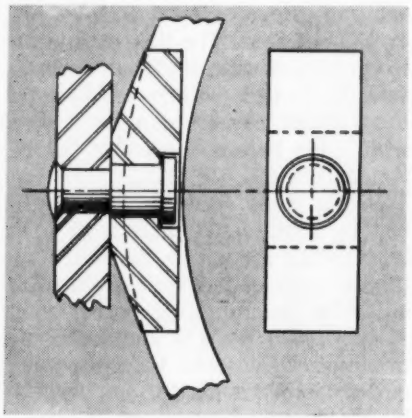


Fig. 14—The long narrow shoe depicted in this sketch is for use with a large diameter shifting spool.

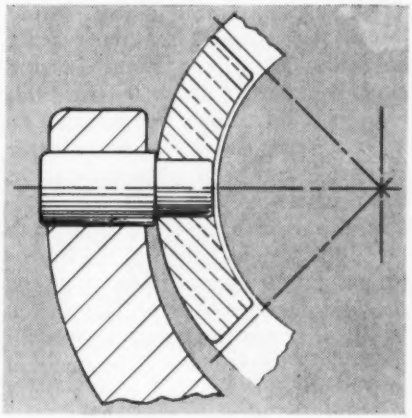


Fig. 15—A method used for making a shoe in multiple form is shown in this particular sketch.

"There is always a chance for error when assembling a square shoe."

cent carbon, drilled, reamed, and cut off to the required thickness, and thereafter case carburized and hardened. The shoe might have to be polished off a bit after hardening for a smooth surface. This square stock usually is off 2 or 3 thousandths inch from standard size and polishing might take off several more thousandths, leaving a shoe of minus 0.005 or 0.006 inch. In some instances this is satisfactory as there might be from 0.010 to 0.015-inch clearance between the groove in the spool and the shoe.

However, when only 0.002 or 0.003-inch clearance is desired for this fit, then the shoes must be ground on the contacting surfaces. Shoes to be through-hardened should be made of approximately .90 per cent carbon tool steel. Usually this is purchased in a black, scaly condition. By this is meant that the stock is not cold drawn to close tolerances. This allows the designer to specify stock usually ⅛ inch larger so that it can be machined down to the proper size.

Let us assume that the shoe is to be 1 inch square. Stock of 1⅛ inches square might be available or at the most 1¼ inches square. The sketch in Fig. 7 shows the wrong way to dimension a square shoe. The decimal and tolerance for the two ground surfaces are proper dimensions. This means the shoe is inspection-proof if the grinding operator finishes the width to 0.998 or 0.996 inch. The fractional dimension usually means plus or minus 0.008 to 0.012 inch, depending on the various shop standards. The designer, methods department, and machine operator all will agree that it would be a waste of time to grind all four edges, and rightly so. But when the assembler gets the shoe, that is when trouble can start. Such shoes have been assembled with the milled sides contacting the spool flanges instead of the way the design was intended. **Should the shoe** be milled to the large tolerance of 1.010 inches, then it cannot be assembled with the spool, as the spool is ground to close limits also. There is always a chance for error when assembling a square shoe. As can be seen in the sketch, the corners should be chamfered about 45 degrees by 1/32 or 1/16 inch, as desired. The hole should also be burred or chamfered on both sides to about 1/64 or possibly 1/32 inch. Other corners can be broken with a file before hardening, which is usually sufficient.

In Fig. 8, the square shoe is modified by making the length ¼ inch longer than the width, the latter being the same as in Fig. 7. If the shoe is to be machined all over, then stock of 1⅛ by 1⅜ inches is the minimum size usable. However, such odd size stock is hard to find, so 1¼ by 1½ inches would come closer to an obtainable size. However, it would be more economical to use 1¼-inch square tool steel. Instead of

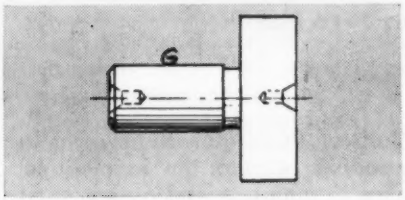


Fig. 16—This sketch shows a design of shifting shoe in which the block and pin are integral.

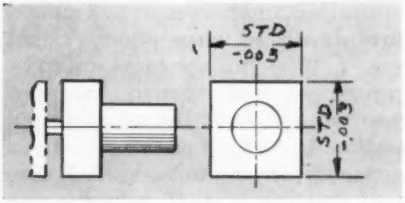


Fig. 17—This sketch outlines a method which can be employed for the machining of integral shoes.

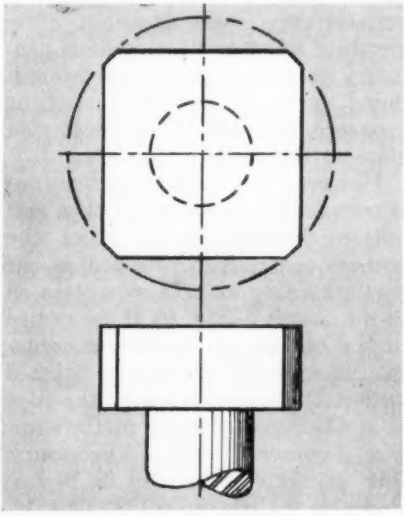


Fig. 18—Round bar stock is sometimes used for shoes like the one shown in the sketch herewith.

machining 1½ inches down to 1¼ inches for length, if the ends must be finished, then a hand grinding operation would suffice to clean up the edges. Even though the resulting length is 1-7/32 or 1-3/16 inches, the shoe cannot be assembled but one way. The other two sides are milled from 1¼ inches down to 1.020 inches wide. This would leave 0.011 inch for grinding each side.

In these days when tool steel is sometimes difficult to obtain and when costs must be kept down to a minimum, another approach is possible to either of the shoes illustrated in Figs. 7 and 8. Let us assume that a nearly square shoe would be satisfactory; one that is approximately one inch in both directions. A piece of 1-inch square tool steel can be used. The ground contacting sides are finished to 15/16 inch wide. This does not necessitate a milling operation, or in fact two milling cuts, but merely a grinding operation on each side directly from the rough, scaly, pock-marked stock. This would mean grinding off 1/32 inch per side. Now we have a piece 15/16 by 1 inch. The two remaining rough sides are then hand ground or simply polished off with a file. Assuming that 0.010 to 0.015 inch is taken off the rough sides, a shoe 0.936 to 0.938 inch wide by 31/32 inch long results. Such a shoe cannot be assembled wrong and the slight area of contact lost by 1/16 inch of width would not be missed. It should be understood that the contacting sides should be located from the hole, in such a manner that symmetry results. Each side should be ground equidistant from the hole, even split-

"The depth of case should be at least 1/16 inch if the faces are to be ground . . ."

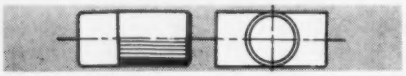


Fig. 19—This shifting shoe is designed to fit a very narrow groove in the component to be moved.

ting the tolerance in half. As shown in Fig. 7, each side would be 0.499-0.001 inch from the center of hole. Interchangability is thus assured. If this is not done, selective assembly becomes necessary and, for this, greater tolerances would be required.

The reader may have seen drawings of shoe blocks on which the two faces were specified to be finished by grinding. In fact, one assembling operator remarked, "What are they using, Jo-blocks?" when he saw a drawing on which grind marks were shown on six sides. It so happened, however, that it was easier to surface grind the faces after cutting off the bar, than it was to mill them. Here again stock can be conserved by cutting off about 1/64 to 1/32 inch full and finishing the sides by grinding before any of the other operations. After heat treatment, only a polishing operation is necessary, especially if the surfaces are hardened where scale formation is nil.

In Fig. 9 the side walls of a shifting spool is shown. The contacting sides should be ground if the sides of the shoe are ground. As shown with a basic dimension of 1.000 + 0.002 inch, the clearance of the shoe shown in Fig. 7 would be 0.002 inch minimum and 0.006 inch maximum. Both of these dimensions give the grinding operator an ample tolerance to maintain and do not create too much looseness when the spool is assembled. The spool need not be made of tool steel even for a good job. A low carbon steel properly case carburized and hardened will suffice.

The depth of case should be at least 1/16 inch if the faces are to be ground so that enough hardened case remains after the grinding operation. In fact, all of the carburized surfaces can be turned off before heat treating so that only the two contacting surfaces are hardened. The grinding symbol as shown on the diameter at the bottom of the faces is not necessary but this can be seen on some drawings. The grinding relief as illustrated is necessary if this diameter is ground. Some form of grinding relief or groove is required if the shoes ride close to this bottom diameter.

However, if a 1/16-inch clearance is permissible between the shoe and bottom diameter of the spool, the corners can remain rounded as left by the turning tool. This can be seen in the sketch in Fig. 10. If the radius at the bottom of the groove corner is 1/16 inch and the shoe is finished with a 1/32-inch radius on the edge or a 45-degree chamfer of the same size, a corner relief is not necessary. The grinding wheel can be broken down on the edge to a 1/32 or 1/16-inch radius or beveled corner. Proper contact between the shoe and spool faces would still remain. The

faces that are ground in Figs. 7 through 10 should be specified as 35 to 40 micro-finish. This is considered a good commercial finish.

The pin upon which the shoe rides and pivots is also an important part in a shifting arrangement. In Fig. 11 a one-diameter pin is shown. The shoe-end of this pin must be provided with a running fit while the portion that enters the shifting fork should be a press fit or at least have a metal-to-metal fit. This pin has the latter fit so that it must itself be pinned through a cross-drilled hole in the ear of the fork. If considerable looseness is permissible between spool faces and shoe, a little looseness of pin might be satisfactory. In any event, if the hole sizes are standardized relative to tolerances and if the pin has a running fit in the shoe, it would be too loose in the ear of the fork. In this construction, if the pin is to be at least a metal-to-metal fit, then a smaller reamed hole is required.

In Fig. 12 this apparent inconsistency is remedied. This pin has two diameters; namely, a running and a press fit. The running fit *A* for a ½-inch diameter is 0.499 + 0.0005 inch while the hole in the shoe is 0.500 + 0.0005 inch. This gives from 0.001 to 0.002 inch freedom, minimum and maximum. Diameter *B* is ground 0.502-0.0005 inch, while the reamed hole in the fork is 0.500-0.0005 inch. This makes an interference fit of 0.002 inch maximum to 0.001 inch minimum. Diameter *A* is ground to a length of the thickness of the shoe plus 1/16 inch so that there will be no chance of binding in the hole of the shoe. The heavy line crosswise on the pin shows the correct position of this dividing point. Some designers specify center holes so that the pin is dogged end-for-end and ground down on centers from stock larger than the finished sizes. Others utilize a piece of drill rod and polish down diameter *A* in a speed lathe collet. In any event, a hardened pin should be used with a hardened shoe.

There are applications of shifters in which the designs shown in Figs. 11 and 12 do not provide the best methods of mounting the shoes. When assembling, the fork with the two shoes in place must be tilted to such a position that one of the shoes might fall off the pin. This is so especially during repairs if they are required after the machine has been in service in the field. This sometimes occurs much to the disgust of the repairman. The design shown in Fig. 13 was evolved to prevent fishing for fallen shoes. The shoe is counterbored for a thin head on the pin. Although it cannot be shown, there is sufficient end clearance so that the shoe may turn on the pin. The small diameter is a press fit in the ear of the yoke. With this design of pin, the clearance between

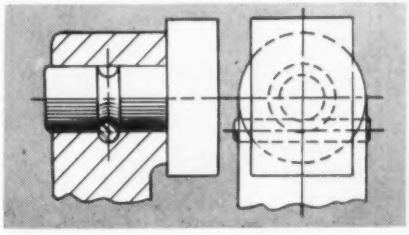


Fig. 20—This rectangular shoe is retained in yoke ear by a pin engaging half-round groove machined in shank.

". . . regardless of design, it is always better to observe equality of movement each side of center."

the head of the pin and the groove diameter of the spool can be kept at a minimum. This is also true of the clearance between the inside surface of the yoke ear as it moves past the outside diameter of the spool flanges. These close clearances are illustrated in the sketch.

The long and narrow shoe depicted in Fig. 14 is used with a large diameter shifting spool. A piece of stock of considerable length is milled off angularly on each side to more nearly conform to the curvature of the spool outside diameter. This gives the shoe a more pleasing appearance, relieving the clumsiness were it to remain rectangular. The long strip is then sawed into the required widths shown at the right and thereafter ground on the contacting sides. This pin is made similarly to the one in Fig. 13, with a head to retain the shoe in the steel shifter. It has a good fit in this shifter and headed over or riveted into the countersunk hole. The shoe has rotational and endwise freedom. This particular design of shoe is for comparatively heavy duty.

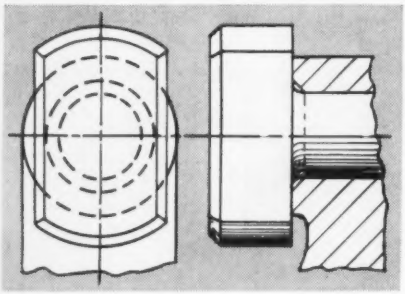


Fig. 21—This sketch shows a type of shifting shoe which is designed especially for heavy work.

Another method of making a shoe in multiple form is shown in Fig. 15. This shoe is made of bronze in a ring and cut apart every 90 degrees. This type of shoe is for short lateral movement only. It is usually good practice to so set the spool that the sliding movement of the shoes perpendicular to the lateral movement is the same above and below the horizontal center line. If, for instance, the fork were positioned at an angle, the shoe would always be on one side of center. If, however, it moves equally each side of the center of movement, it stays closer to the center of the spool. When the inside curvature of the shoe closely follows that of the bottom of the groove, up and down movement is necessarily restricted. This is not the case of the straight-sided shoe in all the previously illustrated designs. However, regardless of design, it is always better to observe equality of movement each side of center.

In this design shown in Fig. 15, the pin is provided with a shoulder, against which the shoe rides. For repair purposes, the fork and the spool must be disassembled simultaneously and the pin jacked out of the hole in the fork. For this purpose a tapped hole is provided, running through the length of the pin. Any kind of a screw, preferably a hex

head screw, is inserted until it touches the spool and rotated, forcing the pin out of the hole. This pin has only a light press fit. The shoes have been made in the form of a pot chuck in which a hollow cylinder of bronze some 8 or 10 inches long is provided with a flange for chucking. The flange is fastened with clamps to a faceplate after it has been centered and then turned on the outside diameter and bored and then cut off to the required length to form the width of the shoe. Because of the ease with which it was possible to obtain a good smooth surface, the extra operation of grinding was eliminated.

In another design, not shown, the pin upon which the shoe rides was held in with a small headless set screw against a milled flat. The pin, however, was somewhat longer. A short tapped hole in the pin was used for a puller. The pin was also one diameter while a boss on the shoe provided the shouldering effect against the finished surface on the inside of the fork.

Shifting shoes may follow another form, in which the block and pin are integral, as shown in Fig. 16. This design can be accomplished in several ways; however, the sketch portrays a one-piece type shoe. Square or rectangular steel stock of the required size is cut off in short lengths and center drilled as closely as possible. It is then dogged and turned down for the pin diameter in an engine lathe. A grinding relief of $\frac{1}{8}$ inch wide by 1/64 inch deep is provided. After heat treatment, the shoe is ground to size. The same suggestion can be followed as to width and length as mentioned in connection with Figs. 7 and 8.

When tool steel is used for deep or through-hardening wear resistance, there is of necessity considerable waste of stock. With this in mind, similar shoes have been made in which the block is made much as that in Fig. 7. A standard pin, purchasable from the makers of socket head screws, is then pressed into the block. If the hole in the shoe is chamfered and the pin pressed in flush, a spot of braze in the chamfer circle will hold the two pieces together. Grinding of the pin becomes unnecessary and hogging out stock is eliminated.

In Fig. 17 is outlined another method of machining integral shoes. Square stock (in this instance, stock of low carbon content) is held in a square collet in a turret lathe for machining. The pin diameter is turned and the shoulder faced, after which it is cut off. Because cold drawn steel is used which ordinarily comes from 0.002 to 0.004 inch below standard size, no further machining operations are performed ex-

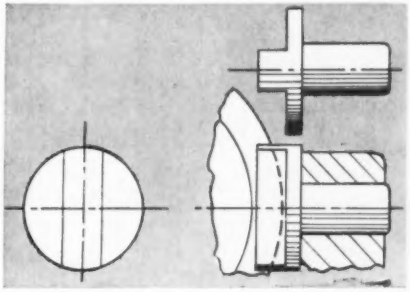


Fig. 22—This sketch shows three views of a narrow shoe which is to be provided with a flange.

"It is possible for shoes . . . to fall out of their sockets . . ."

cept to polish the sides with abrasive cloth. The pin diameter is held to 0.001-inch tolerance. Thereafter, it is cyanided for a thin case and hardened. This is a faster way of making shoes than in the case of the tool steel shoe shown in Fig. 16, provided the job does not require a shoe of greater accuracy and wearing qualities.

Round bar stock is sometimes used for shoes like the one shown in Fig. 18. A square or slightly rectangular shape is milled after turning. This shoe is held in a collet the same as in Fig. 17, using cold drawn steel as the material. Because all sharp corners should be either broken with a file or by chamfering, this method provides the chamfer at the four corners automatically. The size of round stock is selected so that the distance across corners need not be machined. If the remaining chamfer is large enough, a width and length of differing dimensions can be milled. This difference, while although slight, is sufficient to make assembling foolproof.

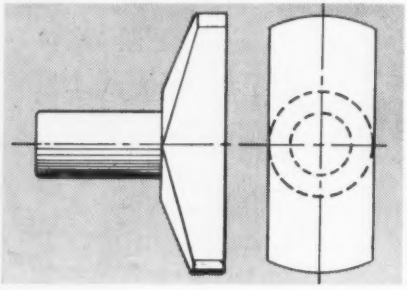


Fig. 23—The sketch shows another design of shoe which is intended for large diameter spool flanges.

Sometimes there are designs which call for a very narrow shifting shoe groove in the spool, gear, shaft, or sleeve that is to be moved. The shoe in Fig. 19 is designed for such a purpose. Rectangular stock slightly larger than the finished size is turned down and the sides milled flush to the pin diameter. In this case, the pin size is ½ inch and the length 1⅛ inches. Rough stock is ⅝ by 1¼ inches. Although this shoe required ground surfaces, no center holes are provided. It is held in a chuck and the pin diameter ground to 0.498-0.0005 inch. Thereafter, the shoe is held by the pin diameter and each side ground flush to the cylindrical part.

It is possible for the shoes illustrated in Figs. 16 through 19 to fall out of their sockets while assembling. In some instances, a means of retention is required. The rectangular shoe shown in Fig. 20 is retained in the fork ear by a pin engaging the half-round groove machined in the shank. A 3/16-inch pin is used, fitting into a groove 0.192 inch wide and half that depth. This provides about 0.005 inch clearance laterally.

In Fig. 21 a shoe for heavy work is shown. Cylindrical stock is used which is turned and the front end chamfered. Thereafter, the shoe is milled to the required width and has the sides chamfered to conform to the circular chamfer. While this is a ground finish shoe, no grinding relief is provided. The corner between the shoe block and the pin is filleted

and the hole in the fork ear is chamfered 45 degrees per side to accommodate this radius. In this case, the back of the shoe—the surface contacting the fork—is also ground true with the pin. This is done on centers.

In Fig. 22, three views are shown of a narrow shoe which is required to be provided with a flange. Here also, the stock is cylindrically shaped. The shoe sides are milled down, yet leaving a round flange against the boss of the shifting fork. That portion of the shoe which contacts the spool flanges is ground symmetrically with the shank so that it can be assembled either way. This shoe is similar to that shown in Fig. 19 except for the flange.

Another shoe for large diameter spool flanges is illustrated in Fig. 23. Cylindrical stock is turned and milled to shape. The side nearest the pin is turned at an angle which closely approximates the shoe shown in Fig. 14, yet provides a round surface instead of a square shape against the fork. Shoes of this size should have their sides ground rather than just milled and should ride in a ground groove in the shifting spool.

Before leaving the subject of this type of integral shanked shifting shoe, other methods of retaining the shoe in its socket are sometimes used. In one design, it was noted that the shank was cross drilled for a cotter pin, the latter having about 1/64 inch clearance from the finished face of the yoke boss. In another instance, a shaft that required shifting was grooved from a 1-1/16-inch diameter down to a 9/16-inch diameter, thereby presenting a ¼-inch circular surface to a rectangular shoe. The shoe and groove width were ¾ inch, the shoe thickness being ¼ inch. The yoke was only of 1⅛-inch inside width. Whether large or small, this type of shifting shoe has been found highly successful.

While the shoes in the various examples described have been made of tool steel and low carbon square or rectangular bar stock, phosphor bronze and Tobin bronze have been used for both the separate block type and the integral types. While all of these shoes work best in a bath of oil, those made of high carbon steel have stood up for a considerable time with only an occasional squirt from an oil can.

In part two of this article, to appear in the next issue of *Modern Machine Shop*, the fork type, straddle type, and yoke and ring types of shifters will be discussed and illustrated.

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"It took Mike six months to get 'em to the point where he doesn't have to hang them up."

8 RECOMMENDED BOX-TOOL SETUPS FOR TURNING STAINLESS STEELS BEST!

How to Machine Stainless Steels with Box Tools

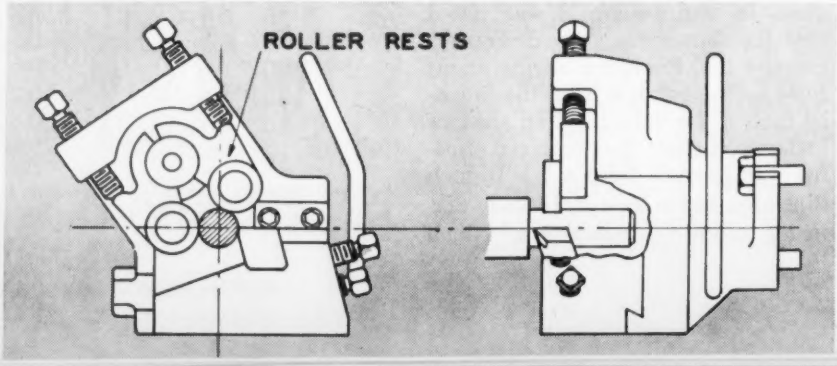
By G. J. STEVENS

The author discusses briefly some of the best box-tool setup practices for turning stainless steels and illustrates how certain problems are solved.

The modern box tool so widely used today in turret lathes or automatic equipment is basically a box-type tool holder fitted with roller-rest or split-V guides. Because V-type rests are susceptible to galling and seizing, the roller type rest, as shown in Fig. 1, is preferred in many instances.

The support rest or rollers, when in use, replace a lathe center to provide support when turning long

Fig. 1—Drawing showing two views of a box-type tool holder equipped with roller rests.



slender pieces. The rest also permits heavy depth of cut, provides additional support to the tool, and imparts a smooth, burnished finish to the turned surface of the bar, as indicated in Fig. 3.

Many different types of box tools are designed by machine tool builders; yet their setups and operating procedures are based on the same principles and on the use of conventional cutter angles of 5-degree side rake—5-degree side clearance. The top and back rake angles are ground to meet various and specific cutting conditions.

Each new setup presents different problems; therefore, major changes in tool setup are frequently necessary to meet the requirements of the job at hand. Because of this it is not practicable to outline an almost endless list of specific hardfast rules for setting box-tool cutters and supports. Rather, it might be more practical to discuss briefly some of the best box-tool setup practices for turning stainless steels and illustrate by drawings how certain problems are solved.

The following recommendations are based on field experience and are believed to represent the most effective current practices in machining stainless steels with the aid of box-type tools:

1. Set the box-tool cutter and supports on the surface of the bar, turned to the desired o.d., and always as close to the spindle head as possible. The turned bar should never be moved from its original position until the box-tool cutter and roller supports are set. If, for ease of setup, the bar is moved after preliminary turning, the original turned surface will be out of alignment

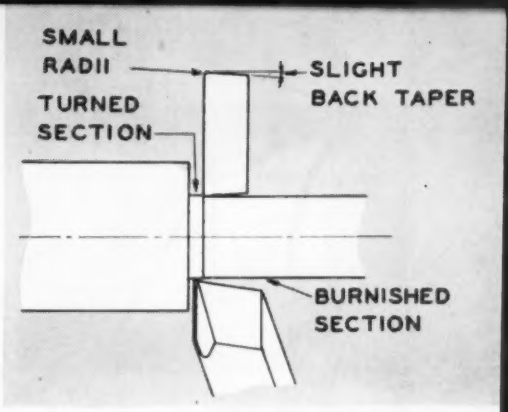
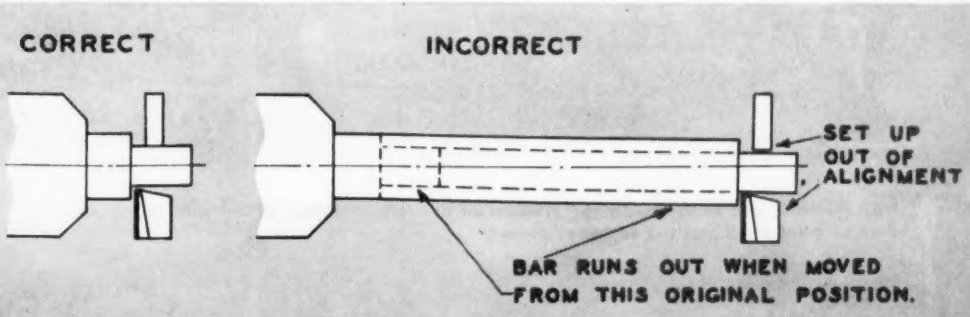


Fig. 3—Support rest permits heavy depth of cut, affords additional support to the tool, and imparts smooth, burnished finish to the turned surface.

Fig. 2—Correct and incorrect setups for turning end of a stainless steel bar with a box tool.



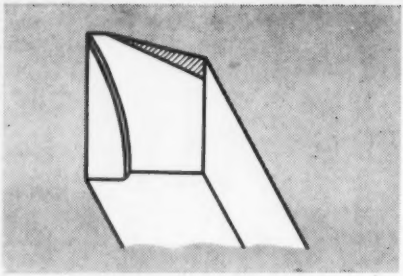


Fig. 4—A chip breaker type of grind, as shown herewith, is usually employed for lighter depths of cut.

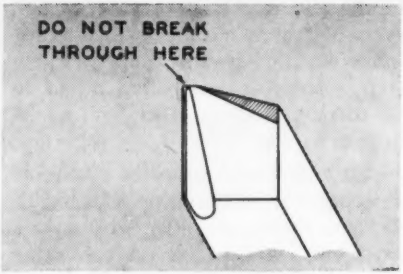


Fig. 6—Grind the chip curler as closely as possible to the trailing edge of the box-type cutter.

with the center of the lathe spindle. If the box cutter and roller supports are now set on the turned action, it will cause the finished piece to be distorted by pressure of the misaligned box cutter and roller rests. (See Fig. 2.)

2. A chip-curler type of grind should be used for medium and heavy depths of cut on the chromium-nickel grades of stainless steel — Types 302, 321, or any of the 300 series with the exception of Type 303. (See Fig. 3.)

The chip-curler grind will facilitate chip removal from the limited

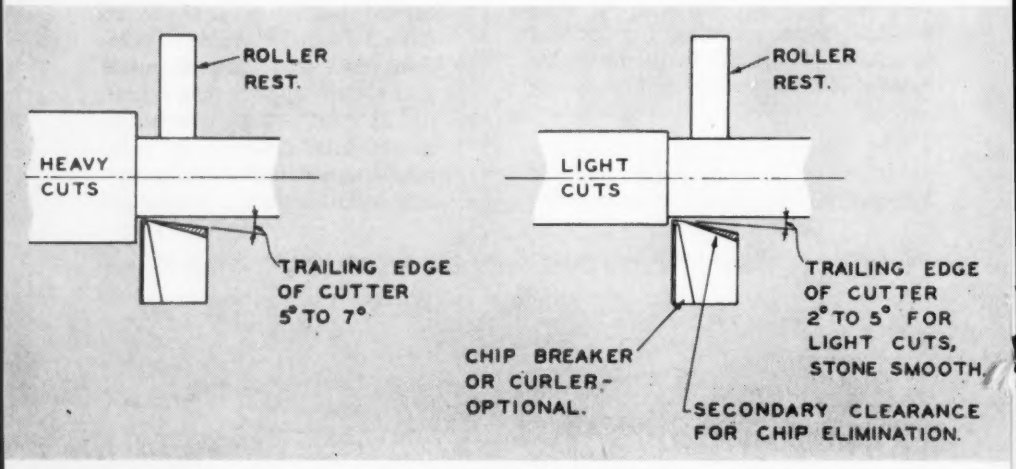


Fig. 5—Heavy cuts exert greater roll pressure on box-turned section; lighter cuts do not produce as great a roll pressure on turned section.

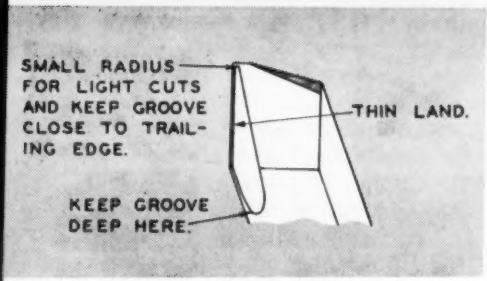


Fig. 7—Change the chip-curler radius at the trailing edge of the cutter for taking light cuts.

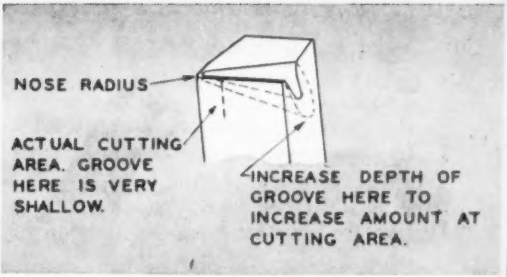


Fig. 9—Change chip curler depth and land width of the cutter to suit different cutting conditions.

boxed-in area adjacent to the box cutter and supports. The importance of this is seen in the chip characteristics of the regular chromium-nickel types, which are typically tough, stringy and difficult to break. Chips of this nature could be a safety hazard unless properly controlled. Also, it takes time to remove a long, continuous chip, and this again calls for the use of the chip-curler grind.

The free-machining varieties of chromium-nickel and chromium grades of stainless steel yield an easily broken chip and do not require the use of a chip-curler type tool. (These steels are Types 303, 416, 430F, or any type with the FM

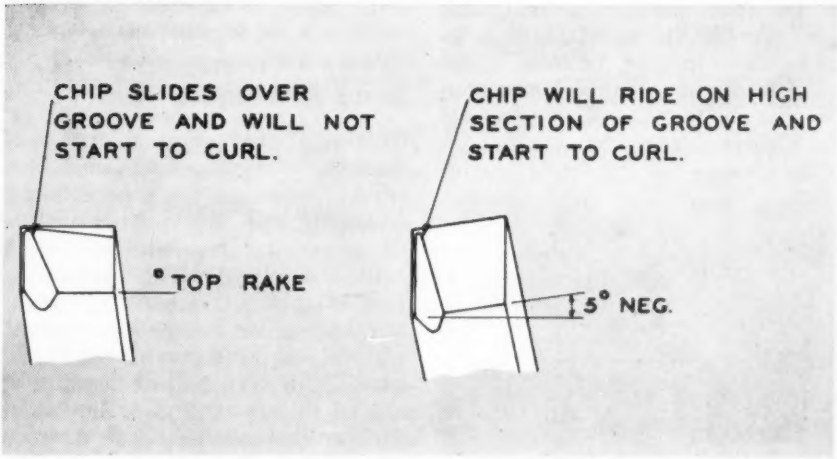


Fig. 8—Use a 5-degree negative top rake angle to make various kinds of stainless steel chips curl out of a box tool.

designation.) Even so, a chip-curler tool has proved quite satisfactory for the FM types as well.

A chip breaker type of grind is usually employed for lighter depths of cut. (See Fig. 4.)

3. Heavy cuts exert greater roll pressure on a box-turned section and thus provide an excellent burnished surface. This does not apply to lighter cuts, which do not produce as great a roll pressure on the turned section. Modifications in tool grinds must be made to improve surface finish with light cuts. (See Fig. 5.)
4. Grind the chip curler as closely as possible to the trailing edge of the cutter. However, be careful not to break through because small chips will work through the small slot and become trapped between roller rests and the burnished section of the work, causing a marred surface. (See Fig. 6.)
5. Change the chip-curler radius at the trailing edge for light cuts. (See Fig. 7.)
6. Change chip-curler depth and land width to suit different cutting conditions. Keep nose radius small. (See Fig. 9.)
7. Use a 5-degree negative top rake angle to make various kinds of stainless steel chips curl out of a box tool. This will place the chip-curler groove above the center line of the cut and force the chip to ride on the high part of the groove. (See Fig. 8.)
8. When turning long sections, insert a bronze bushing in the box tool behind the cutter. This will act as a guide to keep the turned section straight. (See Fig. 10.)

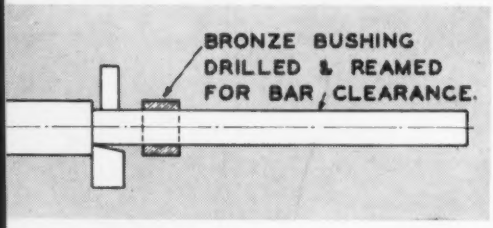


Fig. 10—When turning long sections, insert a bronze bushng in the box tool behind the cutter.

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Band Machining Film

Entitled "Production Band Machining," a 16-mm sound technicolor movie which presents a penetrating re-examination of commonly accepted machining practices has been made available by The DoAll Co., Des Plaines, Ill. Stressed throughout the film is a completely different concept for rapid machining in the production of duplicate parts. Essential to this concept is the use of the contour cutting band machine equipped with a powered work table, plus the use of exceedingly simple fixtures. This plan exploits the uni-

que principles of "band machining" —the ability to remove unwanted material in whole salvageable sections by machining directly to the outline of a part and the elimination of time-wasting hold-downs and clamps in work fixturing because of the constant downward pressure exerted by the cutting tool.

Numerous scenes illustrate how this downward pressure serves to hold the work against the table, thereby confining work fixture elements to simple side and back-up guides. Clear close-ups show the details of cutting in which a narrow, maneuverable band tool navigates complicated internal or external shapes in the toughest types of materials.

The narrative stresses the relatively chipless metal removal of the metal-cutting band tool and the resultant possibilities for salvaging metals so important in this day of expensive alloys. The camera takes the viewer completely through all the operations involved in machining a number of very different parts. According to the manufacturer, this sequence will teach even present users of metalcutting band saws techniques and capabilities never before credited to this particular type of machine tool.

The rapid machining operations pictured in the film include shaping a tool shank, slotting a rotor used in power braking pumps, cutting circles in stainless steel, cutting radii and machining grinding reliefs in locking blocks, shape cutting eccentric actuating levers, notching or altering a die with a "line grind band" and filing eccentric parts with a "file band." Demonstrations of the different finds of band tools introduce the viewer to relatively unfamiliar, but highly profitable, applications of the band machine, such as filing, grinding, polishing and slicing operations.

"Production Band Machining" has a running time of 30 minutes and is available on a free loan basis to business firms, engineering societies, schools and similar organizations.

For more data circle **2** on Reader Service Card

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World's Largest Chuck

The illustration herewith shows what is believed to be the largest rotary permanent magnetic chuck ever made. Manufactured by O. S. Walker Co., Inc., Worcester, Mass., the chuck is 48 inches in diameter and will be used on secret government work. The permanent magnetic type was specified to eliminate electric sparks.



For more data circle **1** on Reader Service Card

Milling with Helical Carbide Milling Cutters



This article is intended to help educate mill operators in the proper use of helical carbide mills.

By R. L. STEVENS

The increasing use of helical carbide milling cutters in the nation's metalworking plants has caused cutter manufacturers to begin a program of educating mill operators in the proper use of these tools. Speeds and feeds are so much higher than to which the average machinist is accustomed that often the cutters are damaged due to improper settings.

Under proper conditions of rigidity, horsepower, feeds and speeds, it is possible to effect maximum production economies by the use of helical carbide cutters. Assuming that we are using a properly designed helical carbide tool, with the proper grade of carbide for the application and the proper helix and face rakes, our first consideration is rigidity.

Rigidity starts with the machine. Certainly it doesn't make sense to put a helical carbide cutter on a machine that was considered inadequate for carbide tools as they have been designed in the past. If the spindle, the table or the knee has excessive play, this will reflect in the finish and the life of the tool. As is the case with practically all carbide tools, a heavy flywheel is an asset to helical carbide cutters since it maintains the momentum of the spindle. When using arbor type cutters, the outboard bearings should be of the anti-friction type; this is a must when milling non-ferrous materials and an extra asset when milling steel. Extra rigidity can be obtained in end mills with a positive drive such as a keyway drive. Certainly, placing the cutter and the workpiece as close to the column of the machine on horizontal setups adds to rigidity.

The author is often asked to inspect a job with the idea of applying helical carbide tools to it. Even when the machines are adequate, we often find jigs and fixtures that were designed with insufficient rigidity for use with helical carbide cutters. To get the most out of helical carbide tools, fixtures should be de-

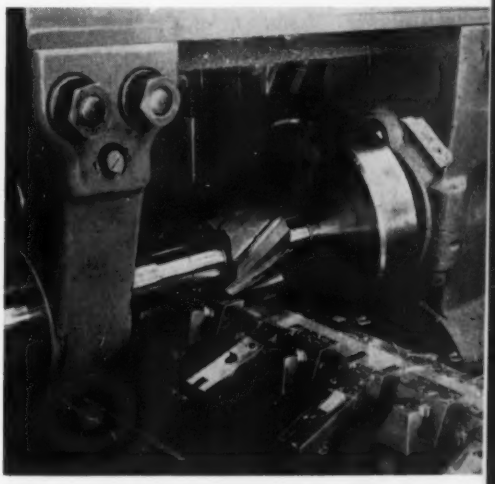
signed with maximum cross-sectional area to assure minimum deflection. Thin sections, webs and irregular contours must have maximum fixture support.

Horsepower is our second consideration. We have proved in actual practice that helical carbide cutters require twenty to thirty per cent less horsepower than normally required for a given cut. However, since helical carbide cutters are capable of removing metal at an unusually high rate, they require more horsepower if they are to be used most efficiently. For this reason, the available power supply must be taken into consideration when determining the depth of cut.

Speeds and feeds are the next consideration. We have found that those as established in the Metal Cutting Tool Institute publication entitled "Milling with Carbide," published in 1947, serve as proper starting points. These are 1000 surface feet per minute for aluminum with a chipboard of nine to fifteen thousandths chipload per tooth and 300 surface feet per minute for steel with a four to five thousandths chipload per tooth. It must be emphasized that these are only starting points. In some cases we have found it necessary to increase the r. p. m. and reduce the feed, while in other cases the opposite is necessary.

It is not uncommon when milling with helical carbide to remove six inches of stock per minute per horsepower. In medium steel, "Milling with Carbide" rates 7.8 cubic inches per minute as maximum metal removal on a 20 horsepower machine. This is 2/5 cubic inch per horsepower. We use as a rule of thumb maximum the proportion of 1 cubic inch per minute of stock removal per horsepower. Recently, the Navy permitted publication of the results of its test of a helical carbide cutter under ideal conditions. This test was run on a 50 horsepower Cincinnati vertical milling machine, in 2340 nickel steel heat treated to 28 Rockwell on the "C" scale. The 3-inch diameter straight shank helical end mill with a key drive adapter was run at 416 r.p.m. spindle speed, cutting a depth of 1 5/32 inches. The table feed was 19 inches per minute. This resulted in a stock removal of 61½ cubic inches per minute, which exceeded the 1 to 1 ratio mentioned.

The chip cut by a helical mill is an indication of the success of the appli-



This combination of a helical carbide slab mill and a flywheel produced finishes of 20-25 r.m.s. on the part shown on the table. It also enabled table feed to be increased five times over that used with the previous tooling setup.

"Finish is another factor that is equally as important as stock removal."

cation. Uniformity of chip formation is obtained because of the constant cutting angle. On steel applications, we find consistent coleration in the chip. This is a result of the chip being sheared off with a minimum of friction between the cutter and the work so that the heat is transmitted toward the chip which is the thinnest cross-section.

As for coolants, in non-ferrous material when we run dry, we encounter a slight build up at the cutting edge. However, with a flow of coolant, the chip is permitted to slide across the face of the carbide and out of the flute. There are successful applications of helical carbide cutters to magnesium where heat can be dangerous. In these cases, the shearing action of the helical construction, plus a jet of air, keeps the chip and the workpiece at a point considerably below the critical temperature.



A tool and cutter grinder set up with grinding fixture to lap blade faces. Note that finger in sleeve causes helix to be reproduced in face of tooth.

In steel the problem is more difficult and one where personal experience dictates proper practice. We have found that when run dry in normalized steel, the cutter encounters no difficulties. Many times a directed blast of air aids in disposing of the chip. In high tensile strength steel, 180,000 p.s.i. or better, a flood of water soluble oil is a direct asset in chip removal and helps to dissipate the heat that is inevitable in cutting steel.

Watching the cutter in use, the first thing that impresses the observer is the freedom with which the chips are expelled from the cut. The helix angle is the reason for this favorable characteristic. This minimum recutting of chips is another factor that enters into longer cutter life.

Finish is another factor that is equally as important as stock removal. It has been impressive in all cases regardless of width and depth of cut. Not only is finish improved with the high speeds and feeds attainable with helical carbide cutters, but the fact that a proper cutting angle can be established and maintained throughout the length of the flute also contributes greatly to the procuring of better finishes.

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". . . there are applications in most shops for helical milling cutters."

The operator is another important considerattion in milling with helical carbide cutters. Speeds and feeds for these cutters are much more than to which the average machinist is accustomed. A step down in r.p.m. and feed can result in short tool life and, in many cases, a broken cutter; therefore, strict control should be maintained if the advantages of helical carbide cutters are to be obtained.

We believe that there are applications in most shops for helical carbide milling cutters. The tendency on first application is to apply such cutters to the toughest job in the shop. We believe that the proper approach in learning to use helical carbide cutters is to take an average job and improve it. With the experience that you gain you will soon be able to engineer your tough jobs for maximum results with helical carbide cutters.

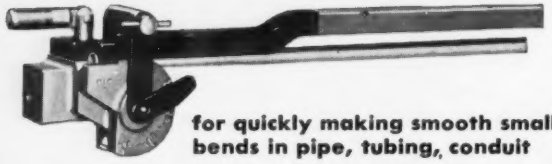
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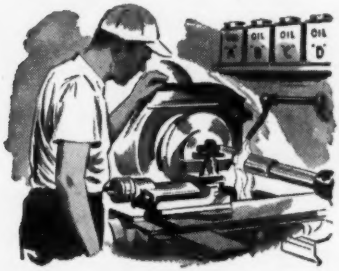
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Employees Can Improve Public Relations



The author discusses a method of securing complete employee cooperation in improving the public relations of any plant or industry.

By ALFRED M. COOPER

The shop and office employees of any factory, to an extent not generally recognized, may strongly, and often unwittingly, influence the attitude of the public toward that plant and its products. Particularly where the plant in question manufactures products sold primarily in the community in which it is located, the opinion of the buying public will affect company goodwill and thus, in some degree, sales and continued prosperity.

Even when the product is marketed on a nationwide basis the buying public forms an opinion from various sources concerning that company. Most of us, for example, know whether or not we would like to work for Ford, International Harvester, or Bell Telephone, and why. Some of the good repute of these concerns has been developed through acquaintanceship with products and service, some through formal publicity, and some from word-of mouth emanating from the people who work for these concerns.

Public utility corporations, banks and department stores for years have appreciated the effect on their business, for good or evil, of local public opinion. More recently it is becoming apparent that the employees of a factory, in addition to the sales and public contact clerical people, may strongly influence public attitude toward that concern.

The importance of salesmen, receptionists, and telephone operators

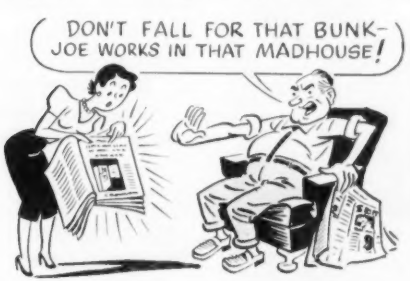
as builders of goodwill has long been recognized. It is customary to train these people carefully in methods of meeting the public. Public attitude surveys prove that employee performance ranks second among the factors influencing public attitude.

Something approaching a crisis in the affairs of a corporation may be called for to point up the tremendous aggregate effect in the concern's public relations of the day-by-day mingling of *all* employees of a plant with their friends and neighbors. A not-too-common instance of the awful power of unfavorable employee publicity is where a company spends tens of thousands of dollars in an honest effort to convince the citizens of the community in which it does business that it not only manufactures a superior product but that its plant is "a good place to work."

But suppose some important segments of the thousands of employees in that plant should happen to be telling their friends that they are working in a madhouse. Day after day, and particularly night after night, this thoughtless, unfavorable exaggeration is disseminated. *Will the public believe the favorable publicity of the company or will they attach more weight to the apparent lowdown coming straight from the mouth of a fellow who works there?*

Some years ago I was afforded an unusual opportunity to observe at close range, and to evaluate by a never-failing yardstick, the power that is generated by the casual public contacts of employees who never meet the public at all during working hours. At the time I was consultant to a large public utility organization, training its shop and field employees in accident prevention, certain office employees in effective methods of meeting the public, and also conducting advanced sales training. About then this utility began to engage in a life-or-death ownership struggle, to determine whether or not it or its competitor would go out of business. These ownership battles occur occasionally in the light and power business, and they are dillies.

The voters of the community in this instance, would determine the issue in the course of a series of city-



"Will the public believe the favorable publicity . . . or will they attach more weight to the apparent lowdown coming straight from the mouth of the fellow who works there?"



". . . such a pronouncement by an executive of a corporation is going to do some damage to a plant endeavoring to maintain its reputation as a 'good place to work.'"

". . . employees were requested to pass on the information . . ."

wide elections. There were five such elections in all, and in each the utility had measures on the ballot, the passage of which were vital to its continued prosperity. Theretofore, the company had won about as many of these local elections as it had lost. In this series, however, the company could afford to lose none. In studying employee reaction toward the approaching first election I found these people frankly uninterested. In their estimation, elections were something for management to worry about.

In an effort to remedy this and enlist the support of the utility's own employees, I prepared text material outlining the company's position in the controversy, as fairly and impartially as possible. Then two rounds of meetings were scheduled, in which every employee was afforded an opportunity to become familiar with these facts.

At the close of the first of these meetings the employees were requested to pass on the information they had received to their "friends and neighbors" (there is a distinction here), giving these citizens the utility's side of the story. Afterward they

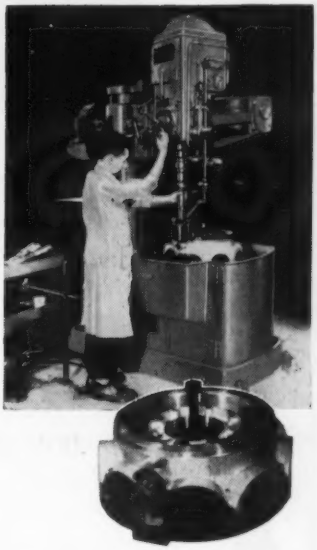


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". . . employees did not disseminate harmful information . . ."

were to report back on the number of contacts thus made.

The employees reported an average of better than eight favorable contacts each, and this solid core of 85,000 favorable votes is sufficient to swing any special election, even in this large city. Management gave its crusading employees major credit for winning five elections within a period of less than two years, after which its competitor was absorbed and the company's continued existence assured. These employees did not disseminate harmful, false information (as might otherwise have been the case) but they took positive, concerted action to get the truth before the public.

An instance such as this is extreme, and it is not likely that the employees of the average manufacturing plant ever will be asked to electioneer in behalf of their company. Nevertheless it interested me as an example, subject to close evaluation, of what can be accomplished when thousands of workers are telling the identical favorable story about their company to their friends and neighbors. The election results afforded a fairly accurate yardstick with which to evaluate the success of the training program. There is a tremendous latent force here, and when the need arises it may be utilized in any plant.

Until some organized effort is made to direct the employee's after-hour contacting it is surprising how the most enlightened company

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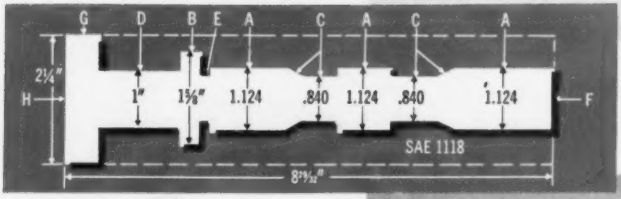


IN 1947 this job took...

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A. Turn — 694 RPM — .015" Feed
B. Turn — 489 RPM — .015" Feed
C. } Form — 119 RPM — .0025" Feed
D. }
E. Face, shoulder, neck, undercut, HSS
F. Face 243 RPM — .0035" Feed
G. Knurl
H. Cut off — 243 RPM — .0035" Feed





IN 1954 this same job takes...

5.00 min.

FLOOR TO FLOOR

A. Turn — 1000 RPM — .022" Feed
B. Turn — 1000 RPM — .022" Feed
C. } Form — 340 RPM — .0035" Feed
D. }
E. Face, shoulder, neck, undercut
F. Face 489 RPM — .0055" Feed
G. Knurl
H. Cut off — 489 RPM — .0055" Feed

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". . . company policy may become twisted in the telling . . ."

policy may become twisted in the telling into something unpleasantly detrimental to the interests of employees and townspeople alike. One thousand or fifty thousand uninformed workers, talking loosely, can inadvertently do an unbelievable amount of damage.

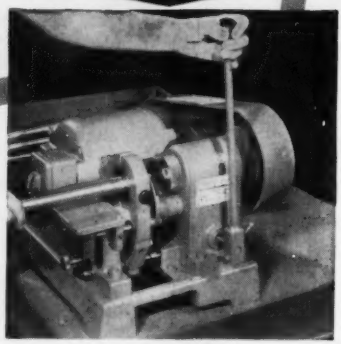
And it is not always the workers who say the wrong thing. In one very large plant a beautifully equipped, complete hospital unit was installed. Properly publicized, this facility should have been a real feather in management's cap. But at a big downtown dinner an executive of this company told the assembled crowd, "We've got a fine new hospital out at our plant, staffed with two excellent doctors and several nurses. With this splendid facility we now have no difficulty in handling 500 accident cases a day." Next day this information was featured in every paper in the city.

Naturally, such pronouncement by an executive of a corporation is going to do some damage to a plant endeavoring to maintain its reputation as a "good place to work." And the corrections and explanations later published probably went

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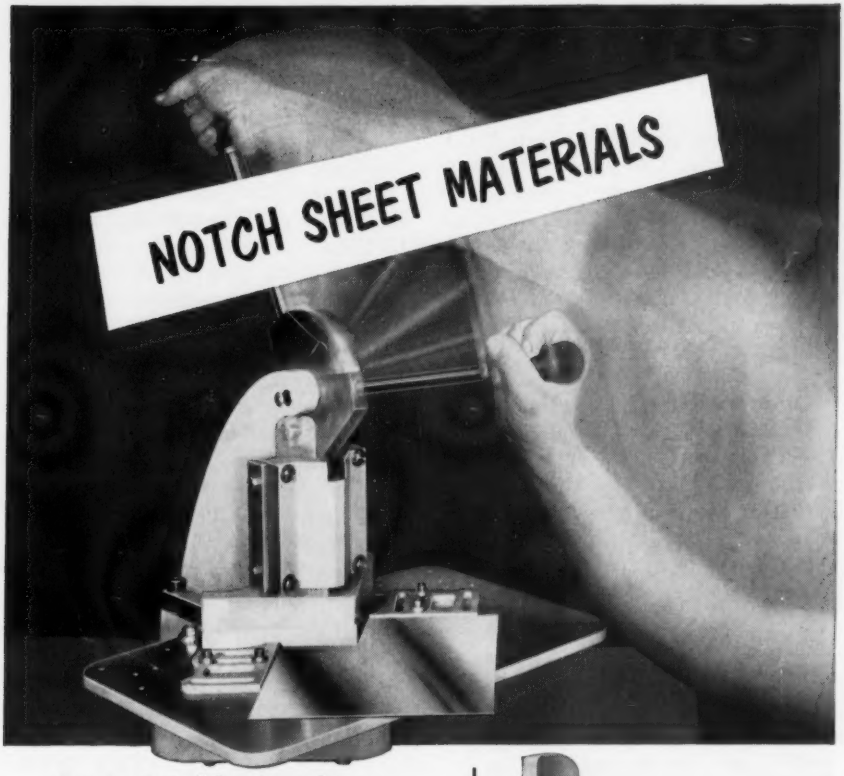


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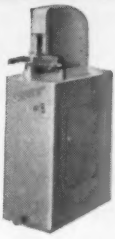
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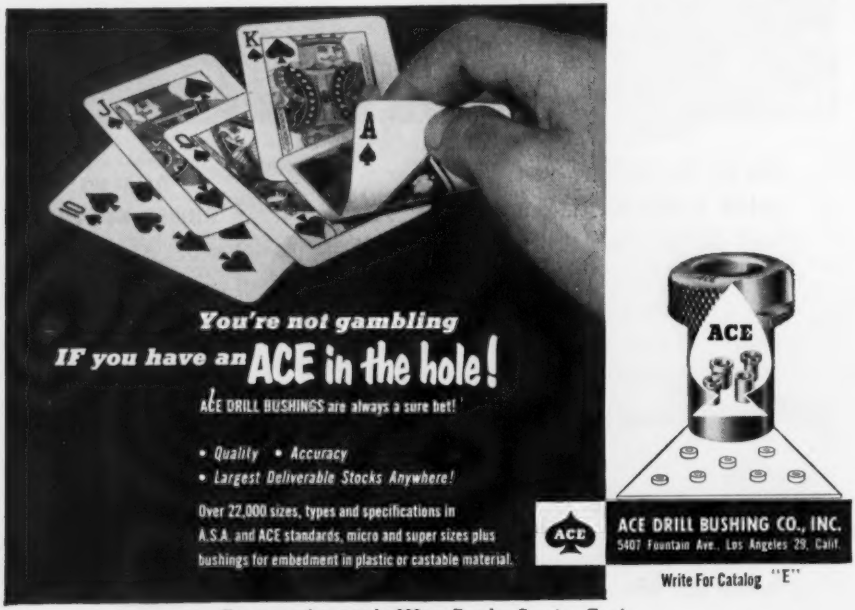
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"Insuring that employees present truthful reports is a job."

largely unread. That plant employed 45,000 people. The public utterance of the executive was dramatic and damaging. But what those thousands of employees were telling their friends about this and a hundred other matters, nobody knew. As one of these employees I would say most of the information thus passed out was at least as misleading as the hospital publicity, and some of it much more so.

The workers there for one thing, knew almost nothing of the problems management was facing. They were never encouraged to know. But when asked questions about their own plant they disliked to own ignorance so they could be depended on to *say something*, however inaccurate and no matter how bad it made their company look. And this, of course, was the version the public was likely to credit, coming as it did from one who worked there.

Insuring that employees will present to their friends uniform and truthful reports regarding conditions in their plant is essentially a training job. Just issuing printed or mimeographed brochures to these people will not do the trick, for the reason that you have no way of knowing whether any employee can or will take the trouble to absorb the information thus presented to him. Neither can you be sure that he will be disposed to pass on this information to others outside of working hours. Until the employee has been encouraged to do a little thinking



For more data circle **366** on Reader Service Card

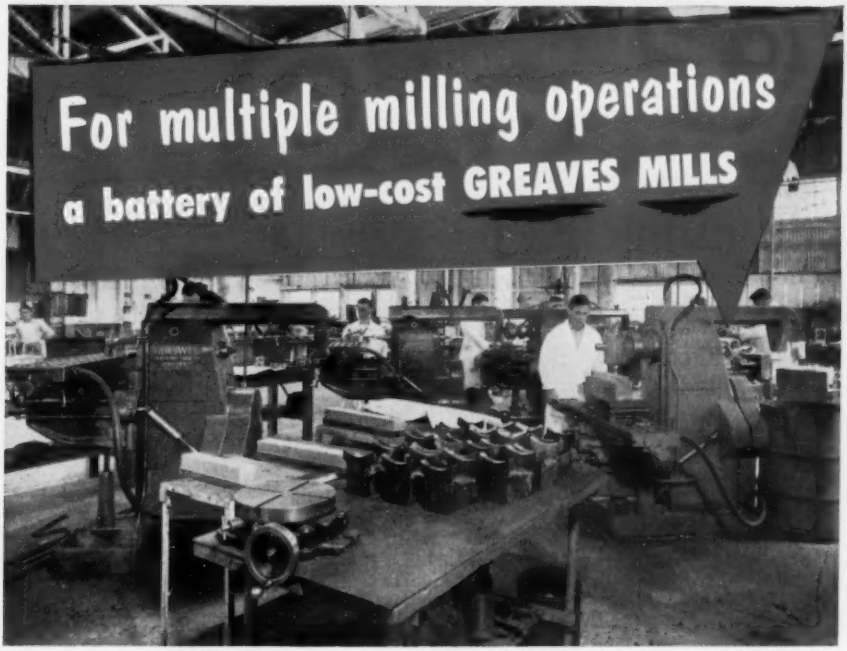
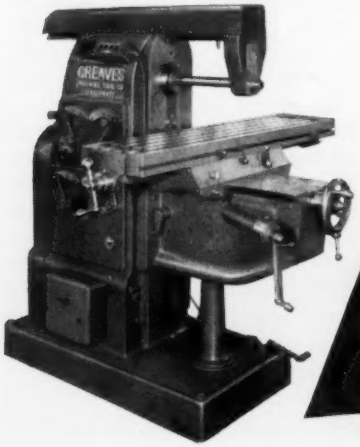


Photo Courtesy of Mendelson McCarthy Co., Long Beach, Calif.

multiple mills speed production, save set-up time!



When you get 5 milling machines for the usual price of 2 or 3 . . . set up "production line milling" that's easily adapted to an extremely wide range of parts . . . you also get important savings! So reports an aircraft parts plant that installed 5 GREAVES MILLS, saved capital investment, production and set-up time!

With extra-size tables, 60" x 12" having 34" travel, GREAVES MILLS can be set up for fast, precise machining of larger parts requiring longer travel. Attachments include: dividing heads, vertical and universal milling, rack cutting, slotting, rotary table and others.

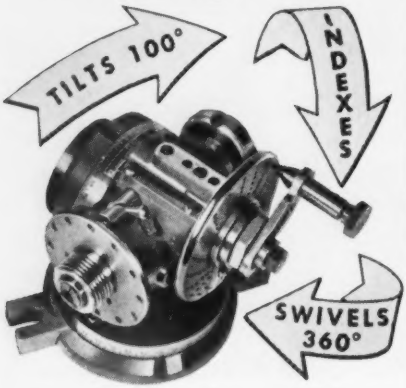
Write for Price and Performance Comparison Chart

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ELLIS
dividing head



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NICHOLS-MORRIS CORP.
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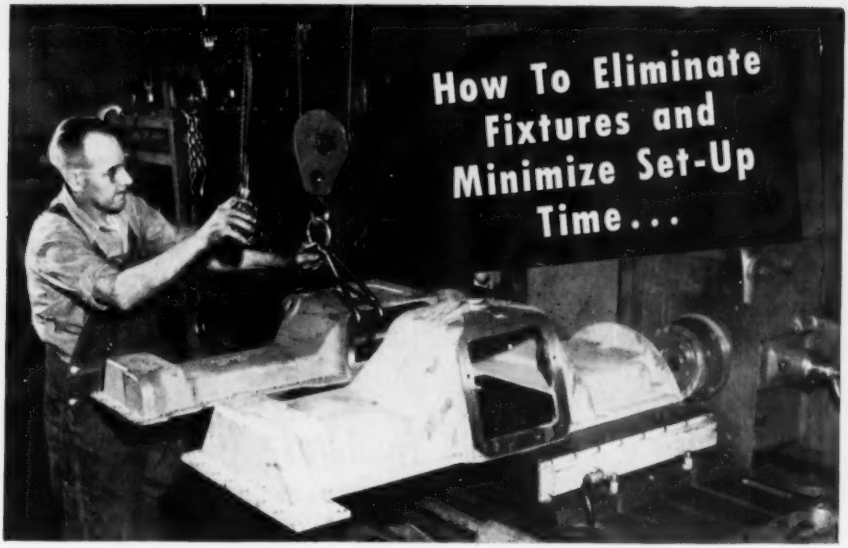
". . . information passed on must be 100 per cent accurate."

about the matter he may feel no responsibility whatever for improving his company's public relations.

Thus, there are two phases to any such program of public relations training. First, the employees must be informed, not with regard to a lot of minor detail relating to organization or administration, but specifically concerning those vitally important policies of management which can most favorably affect public attitude. These matters may classify as recent innovations (such as an improved profit-sharing plan) or they may be excellent but little-known policies of long standing that should be accorded the widest word-of-mouth publicity.

Secondly, the employees must be taught how best to pass out this information whenever the opportunity affords — perhaps when someone asks questions or in the course of a friendly discussion with visitors in the home. Under these circumstances the citizen-recipient is least likely to be resistant to new and favorable ideas.

The first requisite of the information passed on to the employees for dissemination must be that it is 100 per cent accurate. If, even through error, an effort should be made to persuade the employees to pass out misleading information, the entire program would at once lose all meaning to these people. But there is never any occasion for this to happen deliberately, and the administrator of the informational program



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Here's how Caterpillar Tractor Co. uses Sundstrand magnetic chucks to eliminate fixtures and cut down set-up time. A pair of chucks are used as a permanent set-up for milling the bell end flange on 26 different oil pans. Prior to installation of the Sundstrand chucks, their pans required 7 different fixtures and from ½ to 1½ hours set-up time. With magnetic chucks, a throw of a switch will secure or release either or both pans instantly. If you have milling or grinding operations in your plant it will pay you to investigate Sundstrand magnetic chucks.



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For more data circle 369 on Reader Service Card

". . . information released may be received with skepticism."

must see to it that it does not happen inadvertently.

Lecturing to employees in large groups has the same drawback as issuing brochures. There is no effective way, either to be sure that the employees have absorbed the information properly, or that they are minded to do a good job in passing it on to the public. Written or oral exams would be altogether out of place here.

If the job is to be done right the employee must attend a conference with his fellows where this information can be thoroughly discussed. After that, each worker should be furnished with the printed matter for reference. In practice it is found that such company-wide meetings usually need be held but once or twice yearly — that is, whenever there arises a vital need that certain information be accurately presented by the employees to the citizens of the community.

It is not surprising that information released by a corporation obviously for publicity purposes may be received with a certain amount of skepticism. Citizens have



For more data circle 370 on Reader Service Card

New SIOUX Electric
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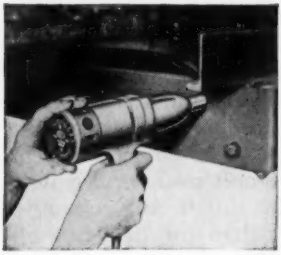
No. 325 only $99.75
No. 330 only $127.50

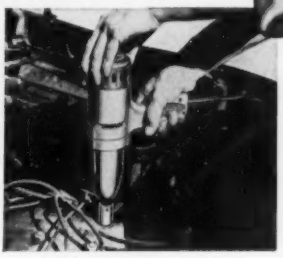
Now you can have the extra power and performance of a SIOUX Impact Wrench!

In no type of tool is good design and quality manufacture more important . . . nowhere will traditional SIOUX dependability and long life be more apparent and more rewarding.

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Your SIOUX Impact Wrench *can't be reversed with the switch on!* This exclusive design feature eliminates a common cause of burned commutator—brushes, and switch contacts. It's one of the reasons SIOUX Impact Wrenches will last longer!







SPECIFICATIONS

Wrench No.	Capacity Bolt Size	Socket Drive Size	PRICE
325	⅜"-⅝"	½" sq.	$ 99.75
330	⅜"-1⅛"	½" sq.	127.50

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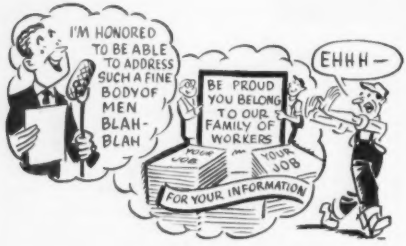
For more data circle **371** on Reader Service Card

". . . whether the employee's information is accurate or erroneous, people give his statements unhesitating credence."

come to expect any company or governmental organization to put its best foot forward when issuing policy statements to the press.

On the other hand, whether the employee's information is accurate or wholly erroneous, people have a way of giving his statements unhesitating credence. They reason that this person has no axe to grind and so his assertions may be accepted at face value. And besides, he works there, doesn't he?

There is nothing like a good hot discussion to fix pertinent facts in the mind of the employee. And should motivation to cooperate be called for, discussion in a small conference group permits the leader to persuade those present that they have a responsibility in the matter of helping improve their company's public relations. The truth is, this latter objective is the more important one, *since the issuance of any amount of informative material to the employee has little value unless the worker is minded to disseminate it.*



". . . the issuance of any amount of informative material to the employee has little value unless the worker is minded to disseminate it."

Hiring a corps of instructors to conduct these meetings is expensive and unnecessary. A better job is done if each meeting is conducted by the immediate superior of the employees in attendance.

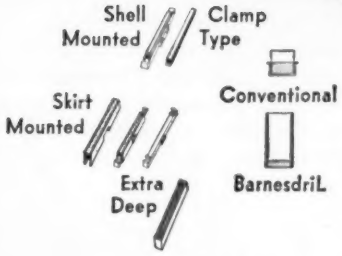
Whereas it might be difficult to develop all foremen as accomplished public speakers it has been found relatively easy to teach any supervisor how to lead a resultful conference. Since the qualities of a good supervisor and those of a good conference leader are identical, the effective supervisor has no difficulty getting results through discussion.

In the aforementioned public utility corporation I utilized the services of 150 supervisors as conference leaders to get over the necessary information and motivation to 10,000 employees. Each supervisor led two or three meetings with attendance limited to 20 or 30 to a group. Each employee attended two meetings, but under any circumstances other than the exigency of a hotly contested election campaign, one would have been enough. Even so, each round of meetings was completed within four days without interfering with work schedules.

Most plants now conduct some sort of formal training in accident prevention. Many corporations also train their salesmen and office public contact employees in effective methods of meeting the public. Where these types of training are



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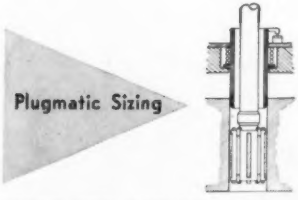
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For more data circle **372** on Reader Service Card

"If employees are not minded to cooperate with management, something is seriously wrong with labor relations . . ."

already carried out by conference method a hard core of experienced discussion leaders already is available for the bigger job.

Otherwise, it is possible to train supervisors as conference leaders even while they are leading their first conferences. The point is that instruction of subordinates is a natural function of any supervisor, and it is to this immediate superior that employees are accustomed to look for new information relating to machines and processes. A supervisor is constantly teaching, and a good supervisor likes to teach his own subordinates.

Two other points should be borne in mind by the executive who is to administer such a program of employee information. The first is that employees will accept the word of their supervisor that the information he is passing on to them is accurate and complete. The second is that no one else is in as good a position as the supervisor to see to it that the individual employee is properly disseminating this information. *This check by the superior can be made whether or not the workers are asked to report back to their boss on their progress as goodwill emissaries.*

From the above it will be evident that it is only necessary to sell the supervisors on the practicability of this program, after which they will understand how best to secure the cooperation of their own people. At no time is it permissible to employ coercion in persuading the workers thus to cooperate with management. Such tactics are never necessary, and certainly would fail of their objective if essayed. If employees are not minded to cooperate with their own management, something serious is wrong with the labor relations in that plant. In practice, the functioning of this program serves directly to improve management-employee relationships. The employee who has gone to bat for his company thereafter feels more a part of this organization.

Right at its inception any such program as this always is met with a certain amount of skepticism by the employees. This is a natural attitude, and these people must be convinced that this thing is strictly on the up-and-up. Thereafter they learn that management is going to some trouble to inform them of what is going on at the policy-mak-

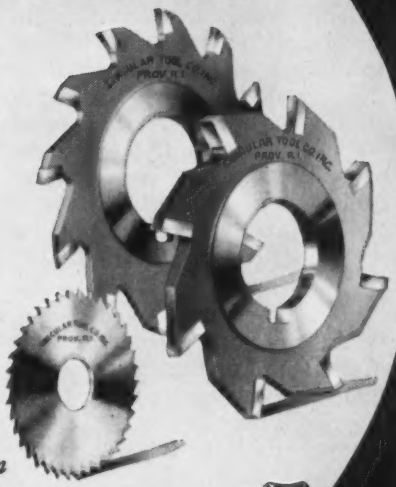


"This check by the superior can be made whether or not the workers are asked to report back to the boss on their progress as goodwill emissaries."

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For more data circle **373** on Reader Service Card

". . . management must determine sharpshooting method . . ."

ing level. (They like this.) *And finally, they must experience for themselves the satisfaction of being able to answer truthfully any questions put to them by acquaintances — people who do not work for the company.*

Thus, it is that the first effort in this direction may win only limited cooperation from the employees, but each succeeding time the method is utilized the results become more satisfying. After two trials management will realize that, used sparingly, this program constitutes one of the most powerful instruments for executive control ever devised.

As to the specific topics to be discussed in the employee conferences, management must determine when and what information justifies this extraordinary sharpshooting method of getting it over to the pubic. The urgency of the situation will recommend this method as emergencies arise. Anyone who has closely studied the public relations of a company or industry will have no difficulty calling to mind a number of instances in which such unusual methods of publicizing matters of policy would be wholly justified. In general, I know of no subject that should be taboo, other than matters intended to influence employees with regard to their union affiliation.



". . . they must experience for themselves the satisfaction of being able to answer truthfully any questions put to them by acquaintances."

On the other hand, should it ever become advisable for management to take any problem directly to its employees, organized or not, with a request for the full cooperation of these people in helping management meet an extraordinary emergency, it is nice to have the machinery already in operation that will best handle a contingency of this sort.

The mechanics of this informational training program are simple. When management decides that certain information should reach the public through its employees, without possibility of being garbled, and in a form that will assure its acceptance by the public, the educational director or personnel manager proceeds somewhat as follows:

1. The supervisors who are to lead the discussion meetings are called together and the administrator of the program explains the purpose of the employee meetings.

2. With these supervisors he then leads the identical conference each supervisor is to lead with his own people later in the week. At the close of this conference the supervisors discuss the material and the methods of presentation. Each is

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For more data circle **374** on Reader Service Card

then furnished with a detailed conference plan for future reference, together with a schedule of meetings and the mimeographed material that is to be issued at the employee meetings. (This latter material, in sufficient quantity for presentation to some thousands of employees, is a fair-sized mimeographing and collating job and should be scheduled accordingly.)

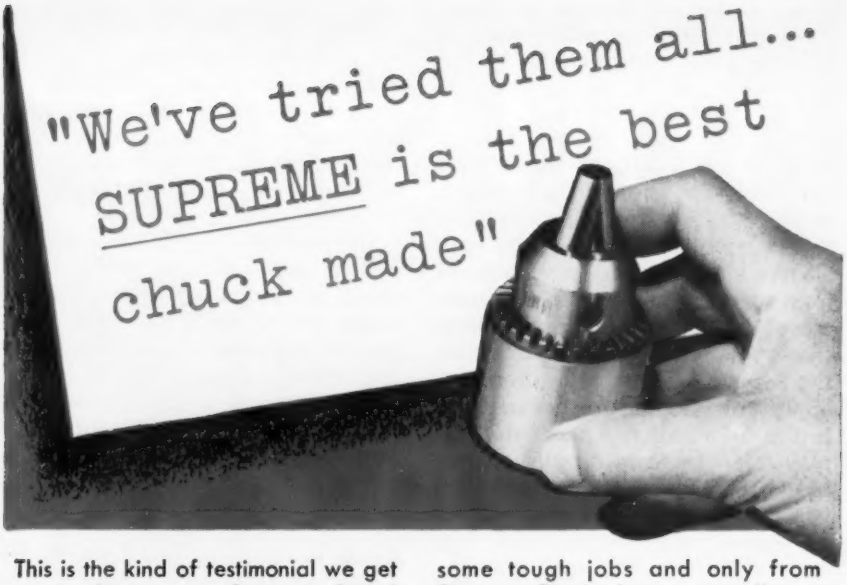
3. The round of employee meetings is held, with attendance limited to 30 and with a 1½-hour period. In each meeting the information is discussed and the supervisor satisfies himself that it is thoroughly understood by everyone present. This, of course, does not necessitate any sort of examination; the discussions will point up any misunderstandings regarding subject matter.

At the close of each conference the employees are requested by their supervisor to pass on this information to any citizen who may be interested; this type of contacting is to continue for a specific period—say two weeks.

4. In exceptional instances a second round of conferences on this subject



For more data circle **375** on Reader Service Card



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Supreme Chucks
BRAND

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For more data circle **376** on Reader Service Card

". . . employee cooperation may be vitally important."

may be scheduled, at which time the employees discuss their experiences in overcoming citizen skepticism or confusion, resulting perhaps from adverse publicity emanating from a source inimical to the interests of the company. In such extreme cases, where genuine conflict exists, the second meeting also affords an opportunity to add further material to the informational program. This may take the form of adequate rebuttal arguments to overcome any last-minute arguments put forth by the opposition.

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Within the affairs of a given corporation there may never arise a situation calling for utilization of such stringent measures as those outlined. In such instance it might be unwise to call on the employees for concerted, intelligent cooperative effort of this type.

In the years ahead, however, occasions may develop within any plant or industry, and on short notice, when employee understanding and cooperation may be vitally important. At such time it is well to be prepared to put a plantwide informative program of this type into effect without loss of time.

★ ★ ★

Cams — Design and Layout. By Louis Kasper. Published by The Chemical Publishing Co., Inc., 212 Fifth Ave., New York 10, N. Y. 101 pages. Illustrated. Cloth binding, board covers. Price, $3.50.

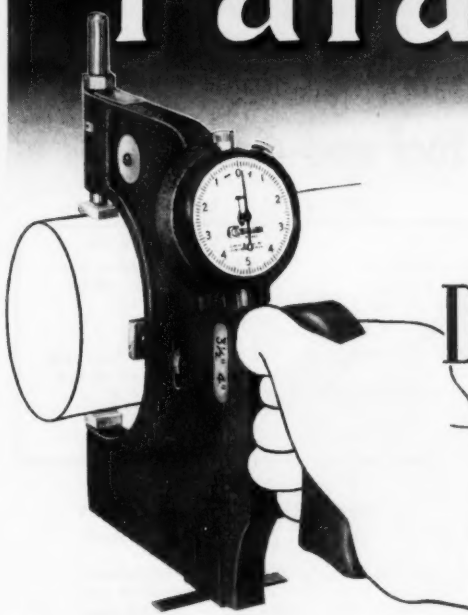
This practical book, based on the author's many years of experience in cam design, is designed for engineers, machine designers and draftsmen. It avoids the two extremes often found in literature; namely, oversimplification and lack of details. It gives sufficiently detailed explanation for intelligent application but no cumbersome calculations which are time consuming and unnecessary in many applications. The examples of design and layout discussed in the book are selected with great care to cover all those cases which occur frequently in industrial uses of cams. The book contains 84 original illustrations which make the simple and clear explanations even more lucid.

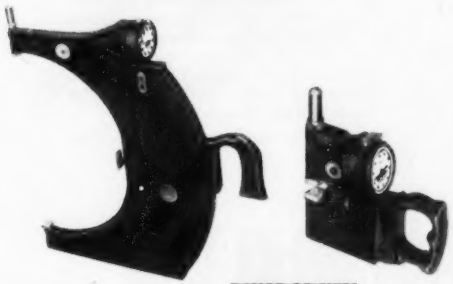
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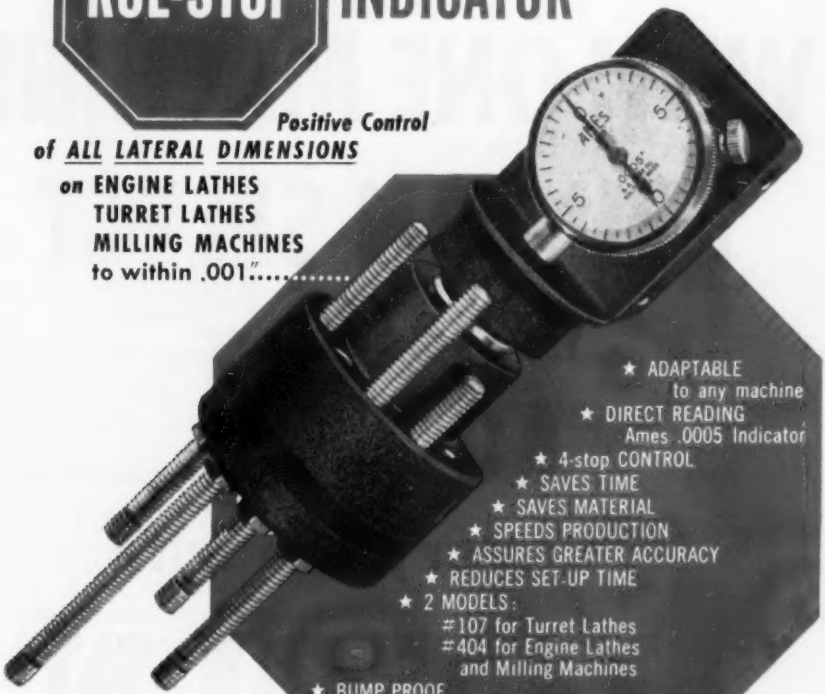
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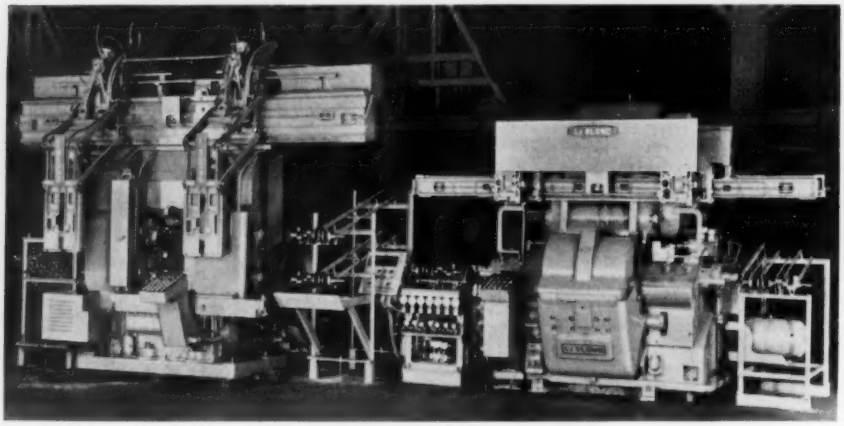
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For more data circle **381** on Reader Service Card

Turning . . . grinding . . . maintenance . . . die handling . . . machining

Automatic Unit Turns 55 Crankshafts Per Hour

Fifty-five crankshafts per hour are turned out by automated crank turning equipment developed by The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio. The new automatic unit completely turns and faces precision-cast V-8 crankshafts; one operator can handle two such units. The automated setup consists of three pieces of equipment. A LeBlond LBA automatic line bearing center-drive lathe turns all five main bearings, flange and pilot, sprocket diameter and front end simultaneously. The crank is then automatically transferred to a Sheffield gaging machine where the diameters of the No. 1, 3 and 5 bearings and the thrust wall width of the No. 3 bearing are automatically gaged. The crankshaft is then transferred by customer's automation to the LeBlond PBA automatic two-spindle



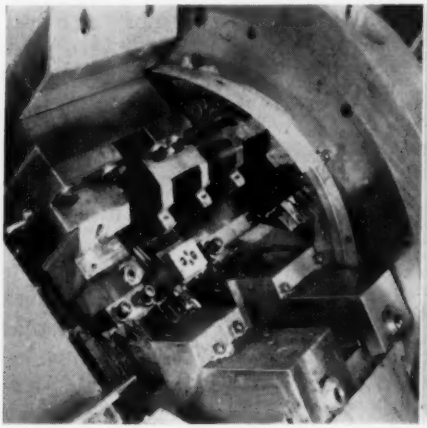
Fifty-five crankshafts per hour are completely turned by this automatic LeBlond LBA automatic line bearing center-drive lathe, gaging machine and LeBlond PBA automatic two-spindle pin bearing machine. (Loading racks shown are temporary fixtures for run off only.)

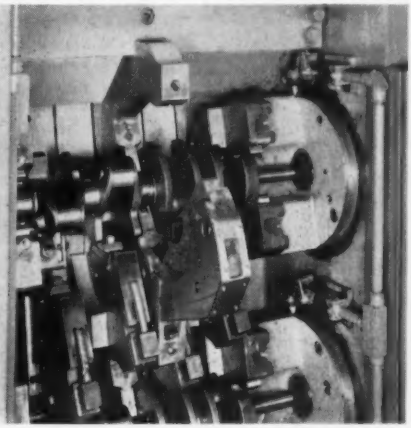
pin turning machine, where all the pin bearings of two crankshafts are turned simultaneously. From here the cranks are delivered into the customer's automation for further machining.

A production rate of 55 crankshafts per hour, including allowances for time to change tools and make machine adjustments, was made possible by the precision shell molding technique by which crankshafts are cast to very close tolerances. All machine parts are electrically and hydraulically sequenced for continuous automatic operation. A console-type push-button operating station includes indicating lights to signal certain conditions throughout the cycle. Manual control of most of the functions is provided for set up, tool change, repair or adjustment.

Before reaching the LeBlond turning equipment, the crankshafts are prepared by centering and milling the ends and locating spots on three lobes. The crank is then picked up by the automatic loader hooks of the line bearing machine and delivered to the chuck. At the same time, the turned crank has been picked up and placed on the V-blocks of the gaging unit. Centers are inserted hydraulically into the rough crank, positioning being accomplished by the left-hand center which moves in faster than the right hand.

In the meantime, the gaging machine has checked the turned crank. If acceptable, it ejects to rear automation and signals "all clear." If not acceptable, the crank remains in gage and a red light on the panel indicates the faulty portion; functioning of the LBA is held up at this point. When adjustments are made, the gage is cleared manually and the machine started again. Rough and finish tool blocks traverse, feed, dwell and retract from





(Left) Close-up view of automatic chuck and tool blocks of the LeBlond LBA. (Right) Close-up view of cranks in PBA. Pin bearings have been turned, steady rest caps have been opened and cranks are about to be picked up by means of the automatic loader hooks.

front and rear simultaneously. The machine jogs to a stop with lock pin determining correct rotational position. The crank is then automatically unchucked, centers are withdrawn and loader hooks pick up.

Cranks with main bearings turned and checked by the gaging unit are delivered to pick up station of the LeBlond two-spindle pin turning machine. Two cranks are picked up by the PBA automatic loader hooks and delivered to chucks while two finished cranks are obtained from chucks and placed in outgoing automation. Main bearings are engaged by the chucks which drive by three milled spots on the crank lobes. Cranks are positioned endwise by ball bearing rollers contacting the sides of the thrust bearing.

Tools are carried by four tool units actuated orbitally by a lower and upper master crankshaft and fed into the work by means of a massive cradle. As the cranks rotate, tool blocks move around with the pin bearings as they cut. The cycle is the same as on the other machine — traverse, feed, dwell and retract.

The entire setup is controlled by various signal devices which indicate the presence of cranks to be machined at the starting point, as well as

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absence of previously machined crankshafts at the outgoing point to clear the second machine for further production.

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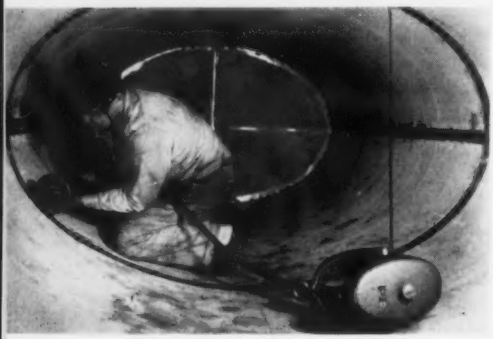
★ ★ ★

Grinding Inside Tank Seams

At the Joe Thomas Co., Lancaster, Pa., a new multi-speed suspension-type flexible shaft machine made by the Stow Mfg. Co., Binghamton, N. Y., is being used to grind down the seams on the inside of stainless steel milk tanks. A hook on the flexible shaft machine enables the unit to be easily lowered through the small hole in the top of the tank. Powered by a ½ h.p. motor, the machine is equipped with an angle head operating at 4,450 r.p.m. and a sanding drum for grinding the tank seams.

According to Thomas Company officials, the new flexible shaft machine has eliminated much of the operator fatigue that formerly was experienced with heavy sanding machines, particularly in grinding the sides and top of the tank. The flexible shaft machine can be operated at four different speeds of 1,725, 2,700, 4,450 and 6,900 r.p.m. and is provided with a 6-foot shaft. The belt and pulleys of the unit are completely guarded, and the machine can be used with grinding wheels, buffing wheels, sanding discs and drums, wire brushes and drills.

For more data circle **4** on Reader Service Card



Operator at Joe Thomas Company is shown using a multi-speed flexible shaft machine for the purpose of grinding down the seams on the inside of a stainless steel milk tank.

★ ★ ★

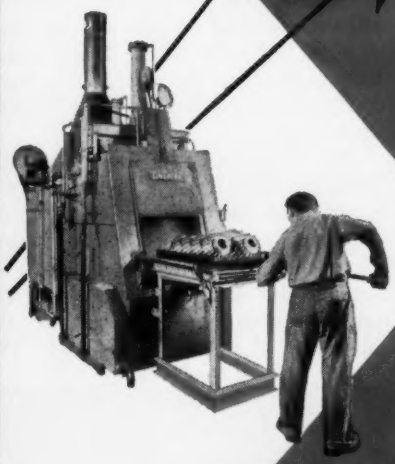
Carbide Wear Parts Reduce Saw Setting Machine Maintenance Costs

By replacing a number of critical parts on its band saw setting machines with cemented tungsten carbide wear parts and inserts, the Henry G. Thompson & Son Co., New Haven, Conn., manufacturer of Milford profile, band and hack saw blades, has reduced maintenance costs to a minimum and obtained uniform product quality in this most important phase (band saw setting) of the company's manufacturing process. Briefly, the band saw setting operation is as follows: Milled stock, to be set, is fed from a drag feeding reel through deburring blades and then between guide jaws and under an indexing feed ratchet. Next, reciprocating dies set the teeth, after which the saw stock is collected on a drag coil reel.

The deburring fixture consists of a spring-loaded Kennametal Grade

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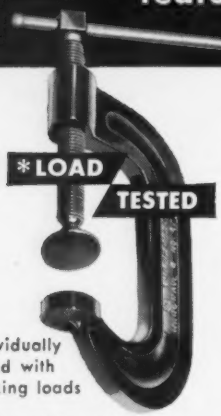
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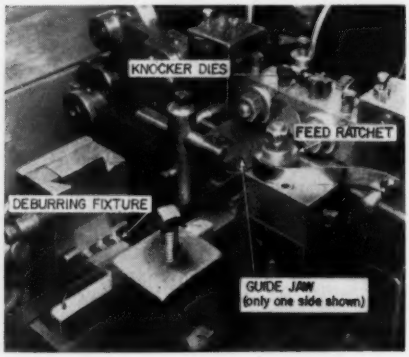


For more data circle **395** on Reader Service Card

K6 plate that bears against the burr-free side of the saw stock, forcing it against three vertically-positioned and adjustable Kennametal scraper blades. As stock is fed through, these blades remove any burr resulting from the tooth milling operation.

The guide jaws utilize long strips of Kennametal Grade K6 brazed to adjustable steel bodies, one on each side of the saw stock. Their function is to keep the stock in a fixed upright position for the teeth-setting knockers.

The feed ratchet, which is solid Kennametal Grade K1, is synchronized with the knocker dies. It indexes on each stroke of the knockers to feed the stock into position for setting the teeth. The pitch of the ratchet teeth corresponds with the pitch of the saw being set. The



Critical steel parts on this band saw setting machine at the Henry G. Thompson & Son Co., New Haven, Conn., have been wear-proofed with Kennametal. Some of these parts have been in operation for more than three years and to date are said to show a wear-life ratio of 60 to 1 over previously used parts.

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5346

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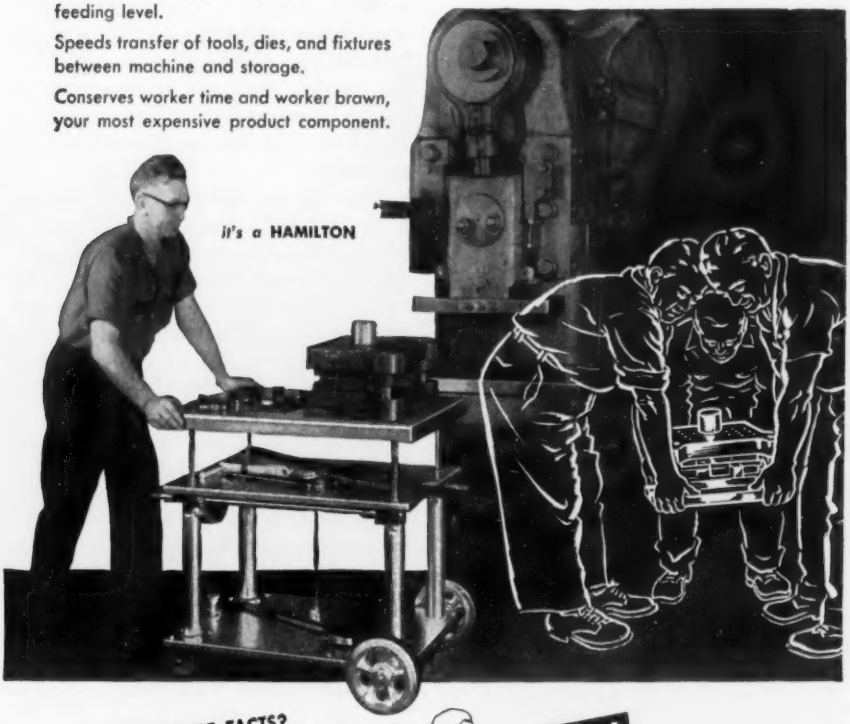
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Conserves worker time and worker brawn, your most expensive product component.

Reduces injuries to workmen, and damage to tools and materials due to manual handling.

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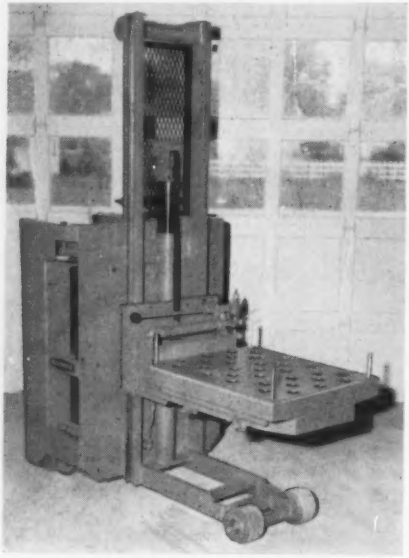
knockers slide in and out from both sides, upsetting the saw teeth on each stroke. Length of stroke and angle on the knockers determine the degree of tooth set. The knocker dies are made of solid Kennametal Grade K6. Both ends can be used before regrinding is necessary.

For more data circle **5** on Reader Service Card

★ ★ ★

Retractable Ball Transfers Make Die Handling Easy

Engineers at Raymond Corp., Greene, N. Y., solved one customer's die handling problem by designing a special attachment for a standard Raymond electric truck. The device consists of two platforms arranged one above the other. Ball transfers are set on the fixed lower platform. The top platform of formed steel plate has openings directly above the ball transfers. It is fixed to the lower platform by a hinged arrangement and is actuated by means of a hand type hydraulic pump.



Standard Raymond high lift electric truck with attachment to facilitate die handling.

When the top platform is in the lowered position, the ball transfers protrude above its surface to allow easy movement of heavy dies. Removable pins, set into corner sockets, prevent the die from rolling too far. As the top platform is raised above the ball transfers, the die rests solidly on the flat surface for safe transportation.

The die attachment is mounted on a standard Raymond high lift electric truck which is especially designed for narrow aisle operation. The use of ball transfers allows a worker to load or unload dies from the front or either side of the platform. A range of elevation from 9 inches to 74 inches makes it possible to transfer dies from standard press beds to shelf and rack storage. Capacity of the specially equipped truck is 2,000 pounds.

For more data circle **6** on Reader Service Card

★ ★ ★

Machining Jet Engine Compressor Frames

The Jet Division of Thompson Products, Inc., Cleveland, recently solved a difficult machining problem involving 310 stainless steel jet engine compressor frames, with the re-

5407

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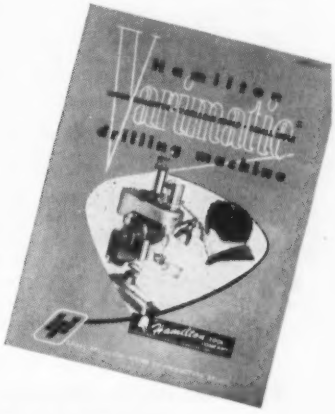
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VARIABLE SPEED • SMALL HOLE
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drilling machine

SINGLE OR MULTIPLE SPINDLES



to drill holes (.004" to 5/16") in all drillable materials, to the most exacting specifications and on the most relentless production schedules.



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sult that production increased from 3 to 14 pieces per 8-hour shift. Primary problem on the job was work hardening of the stainless steel—further complicated by weld spots and interruptions on the outside rim of the frames which eliminated the possibility of materially increasing feeds or speeds.

Because of part dimensions, it was not practical to increase feeds above 0.008 inch. During one trial at a feed of 0.015 inch, for example, excessive tool pressure caused the workpiece to distort. The tools were capable of withstanding the pressure, but the workpiece was not. Production problems were solved when Carboloy grade 370 carbide inserts were applied on the job. Tool life went up immediately, doubling on each operation. With the new carbide, it was possible to turn out as many as eight pieces before regrinding was necessary.

The work at Thompson Products consisted of rough and finish facing the inner ring of the 36-inch piece in the first operation. On this job, grade 370 carbide tools were used in the form of square inserts. They were applied at a feed of 0.008 inch and adjusted for a depth of cut of 0.100 inch at 36 r.p.m. to remove metal at 340 s.f.p.m. A similar Carboloy grade 370 square insert was used in

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False jaws permit wide range of work to be handled. Working range is 0 to 4". Clamping pressures up to 2000 pounds. Force exerted is all straight line. Vise jaws travel on guides—actuated by opposed double-acting cylinders—synchronized mechanically with no pressure exerted through synchronizing mechanism.

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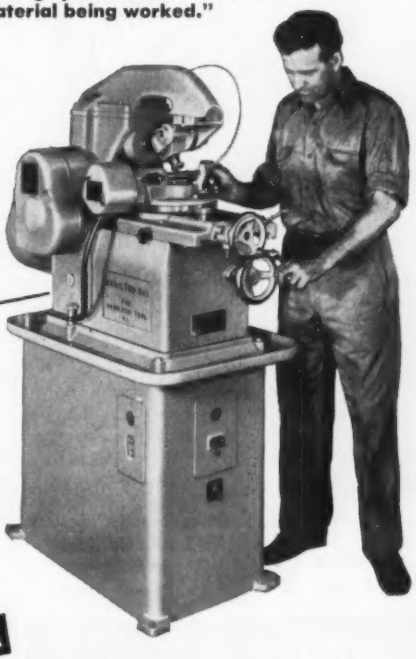
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8409

SHORT RUNS of PRECISION GEARS

Short runs of small, fine pitch, precision gears (gears up to 6" O.D. of the gear blank) carry high unit costs largely because of the top-heavy machine set-up time as compared to total production time. You can beat the machine set-up problem by routing small precision gear jobs to Hamilton Precision Gear Hobbers . . . for:

"Hamilton Precision Gear Hobbers feature independent selection of speed, feed, and indexing; reducing machine set-up time and offering a selection of cutting speeds and feeds to suit (exactly) the material being worked."



if you buy small quantities of precision gears, tell the man to "put your job on a Hamilton." You stand to profit two ways!

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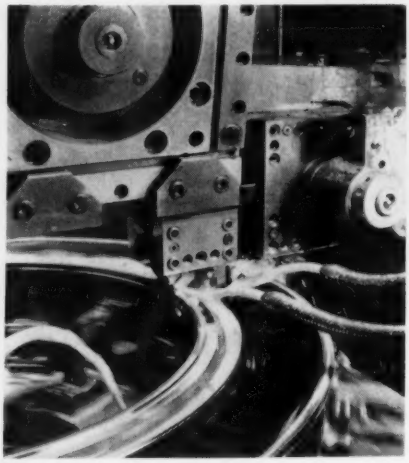
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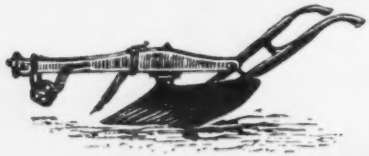
the second operation which called for rough and finish facing the inner band. Feed, depth of cut and speed remained the same but metal removal decreased to 260 s.f.p.m.

The grade 370 carbide also took the third operation in its stride—even though an interrupted cut was involved in rough and finish facing the outer ring at the same feed, depth of cut and speed applied in the other two operations. The new carbide worked equally as well in two subsequent operations—breaking down and turning. In these operations, the tools were triangular shaped and were fed into the work at a feed of 0.005 inch at 36 r.p.m.

For more data circle **7** on Reader Service Card



Close-up view of rough and finish facing operation on inner ring of 36-inch stainless steel jet engine compressor frame at Thompson Products Inc., Cleveland. Carboloy grade 370 carbide in the form of square inserts is used at 36 r.p.m. to remove metal at 340 s.f.p.m.



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The slow steps of the past are gone . . . for the present, the future, get better production and finer finishes with Whitnon Precision Spindles.

Equip your new Surface Grinders with Whitnon Spindles . . . for easy adaptability and for modernizing your old machines.

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Eliminate Costly, Custom-Made Devices



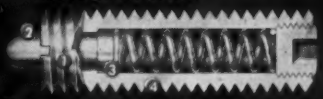
Provide accurate, pre-set end pressures for every need!

Why waste toolmaker's time machining make-shift devices to provide necessary spring loads? Standardizing on low-cost ready-made Vlier Spring Plungers speeds jig and fixture manufacture and insures *accurate, uniform* loading, resulting in more accurate machining, fewer rejected parts!

40 TYPES AND SIZES! Hundreds of thousands of Vlier Spring Plungers are now in use positioning parts in dies, jigs, and fixtures, as detents, locating pins, and die ejectors . . . wherever accurately-controlled, constant spring pressure is needed! *Order a wide assortment of types and sizes from your Vlier distributor today!*

❶ **Plunger end telescopes completely within body!** End pressure is determined with plunger end telescoped 50%.

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❸ **Large bearing surface** assures perfect alignment at any part of plunger travel; eliminates binding and reduces wear!

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4 Nose Types Available!



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Plastic Nose — *For use with aluminum, brass, and other soft, easily marred materials.* Plastic plunger end reinforced for less deformation under loading. Excellent wear resistance; high dielectric strength. End pressures available from 5# to 18# in Standard type, and 1½# to 7# in Silvernose type; various diameters and lengths.

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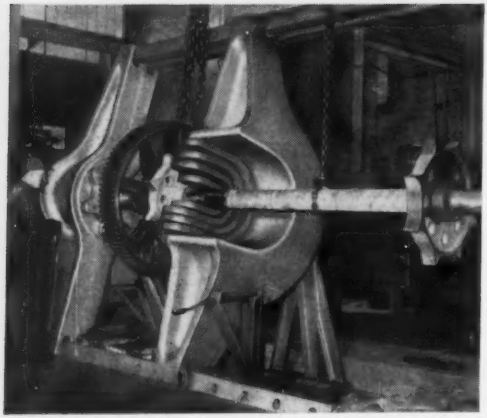


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The heavy machines and equipment used in the great iron mining industry present a variety of problems when repair or maintenance is necessary. For this work the accurately controlled action of Rodgers Hydraulic Forcing Presses is a real time and work saver.

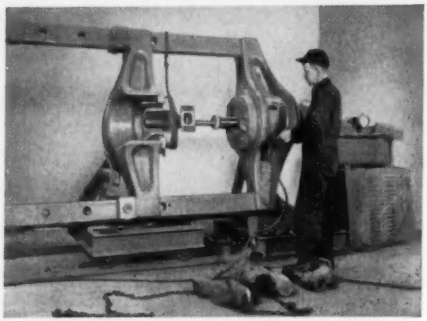
A Rodgers Forcing Press puts a mountain of power at your fingertips to force wheels, sprockets or gears from their shafts and for straightening, assembling, swedging or upsetting jobs. Operators also use the versatility, speed, power and positive control of a Rodgers Forcing Press to efficiently perform small pressing and forcing jobs with just a touch of pressure—tasks once done only on vertical shop presses!

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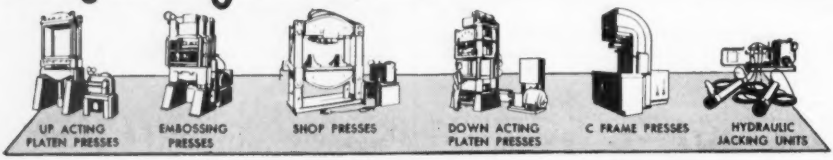


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LIGHT TOUCH FOR SMALL JOBS— This Rodgers 300-Ton Inclined Forcing Press is used on small as well as large equipment repairs. Here, a pin is being pressed out of a tractor idler support bracket.

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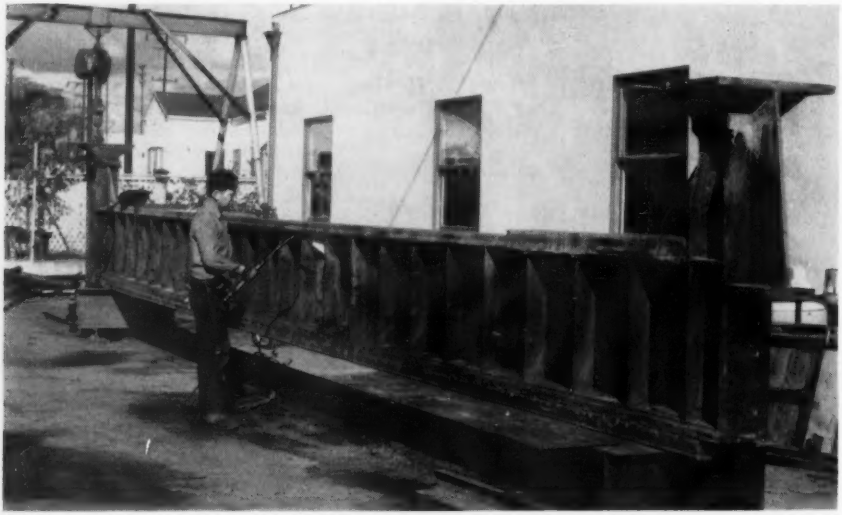
FOUR time-saving suggestions for the man in the shop

Giant Beam Straightened with Heat

By IRA S. ROBERTS

Recently, a giant 17,420-lb. hot rolled steel crane beam suspended over the soaking pit in a major west coast steel company became so warped from reflected heat that straightening was necessary. The major deflection was downward, caused by crane loads while the beam was so hot that it was in a semi-plastic condition.

The obvious way to do the job seemed to be to cut out "V" sections along the long side, press-straighten, and then reweld. However, B. R. Russell, owner of Airline Welding & Engineering Co., Hawthorne, Calif., and a weld engineer of con-



Operator is shown in the process of heating a section of the 17,420-lb. crane beam prior to quenching. The beam is upside down, with the major deflection to be removed being upward.

siderable ability, had other ideas. "We'll use a torch, but we won't cut or weld," he said. "We'll let the weight of the beam do the straightening."

The beam was removed and placed upside down in the backyard of Russell's establishment, with the major deflection curve upward. Large gas-fired pre-heating torches were used to heat the beam, a section at a time, to approximately 1,600 deg. F. When this temperature was reached, the area was quenched by hosing it with cold water.

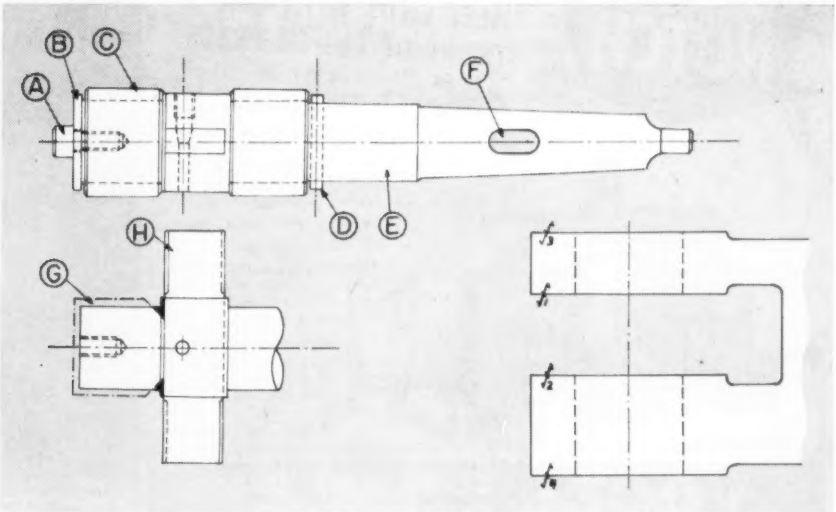
The combinations of stresses caused by beam weight and by quenching near the upward (deflected) side, both working in the desired direction, gradually drew the beam back into alignment. About 2¼ inches of longitudinal curvature were removed. At the same time, but working with quench stresses only, about 1½ inches of laterial curvature were removed. The necessity of constantly checking progress and the question of where to heat and quench the beam to obtain desired results were the main factors involved.

★ ★ ★

Double Spot-Facer Bar Features Roller Pilots

By JOHN ROGERS

For machining large yokes on all four surfaces (f_1, f_2, f_3, and f_4), a double spot-facer bar, as shown herewith, minimizes handling time and also eliminates the need for several different tools. Originally designed for 2¾-inch diameter holes with 5-inch diameter spot faces, a tool like



Sketch of double spot-facer bar which is equipped with roller pilots for use in machining large type yokes on all four surfaces, as indicated in the lower right-hand view of the sketch.

this should prove to be economical wherever it is impractical to employ a straddle-mill (or gang-mill) operation.

The bar consists of two pieces; namely, a shank *E*, and stub, *G*. The shank is rough turned and a slot is milled into it to accommodate a cutting blade, *H*. After the milling operation, the stub *G* is welded to the shank as shown and the weldment is then finish turned. An accurately drilled and tapped cross hole provides a means for locking the blade with a taper lock screw. One hardened and ground roller, *C*, is slipped onto the shank and is confined by a cross pin, *D*, while the other roller is inserted from the front and retained with a washer, *B*, and bolt, *A*. The blade *H* is sharpened on four edges so that it will cut in both directions. To keep the facing bar from falling out of the machine spindle, it is fastened to the spindle by means of a keeper slot, *F*. Many drill presses of larger sizes have keeper slots through the spindles. A small wedge will then secure the bar within the spindle and permit a heavy reverse feed.

★ ★ ★

Safety Chuck Wrench

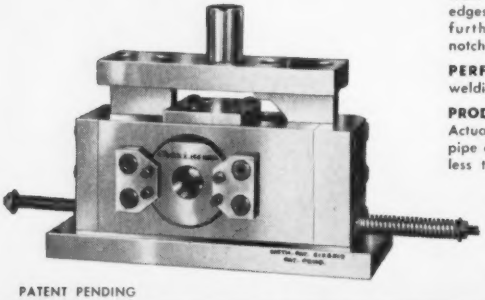
By FREDERICK BARKER

A great many accidents have been attributed to the fact that an operator had forgotten to remove the wrench from a drill press chuck be-

★ ★ ★ ★ ★

NOTCH THESE ENDS WITH ONE STROKE OF PUNCH PRESS

ARC-FIT TWIN NOTCH



PATENT PENDING

NO DEFORMATION Shears from inside out—cuts clean edges; eliminates need for further finishing; aligns notches automatically.

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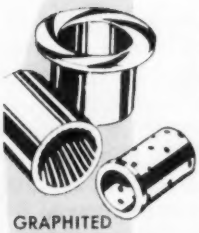
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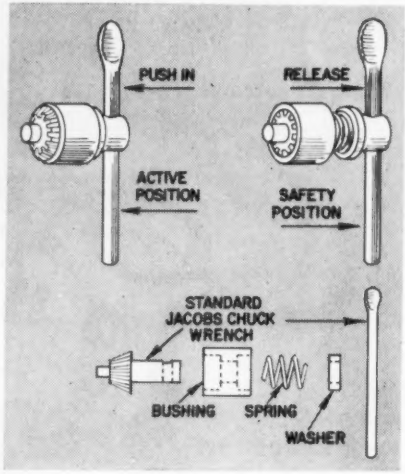
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ideas from readers . . .



Sketch of easily-devised safety chuck wrench

fore starting the machine. The accompanying sketch shows a safety chuck wrench devised by the writer for eliminating such accidents.

The chuck comprises a standard Jacobs chuck wrench, to which has been added a bushing, spring, and washer. In operation, as soon as the drill press operator finishes tightening the chuck and lets go of the wrench, the spring pressure causes it to pop out from the chuck.

★ ★ ★

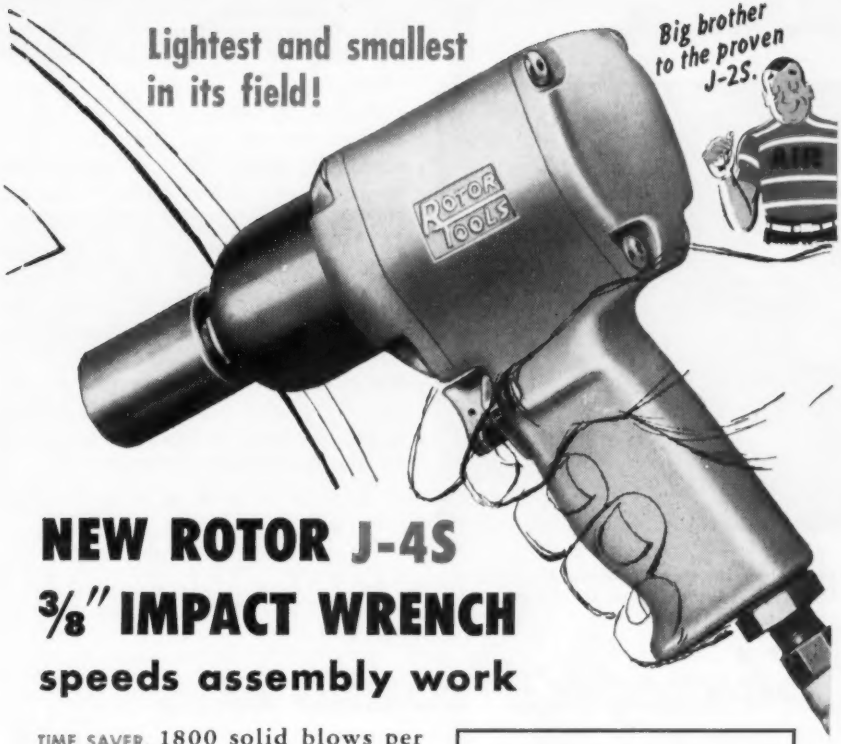
Lifting Rig for Reduction Gears

By JOSEPH KETCHAM

The accompanying illustration shows a rig which the author devised to lift reduction gears for pump-

Lightest and smallest in its field!

Big brother to the proven J-2S.



NEW ROTOR J-4S 3/8" IMPACT WRENCH

speeds assembly work

TIME SAVER. 1800 solid blows per minute.

POWERFUL. More power per pound.

EASIER TO USE. Only 4¾ pounds... 6¾" long. No twist. No stalling shock.

LOW MAINTENANCE. Fewer parts. Interchangeable end plates and bearings. Impact parts can be turned over for increased life.

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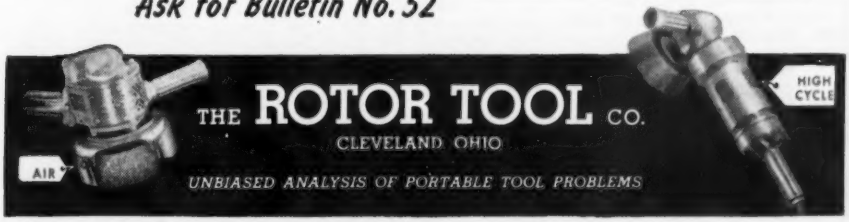
J-4S Impact Wrench (Side Handle)

Rated Capacity (Bolt Size) ⅜"

Drive (Standard) . . . . ⅜" square drive.
Optional ½" square drive or 7/16" female hex quick-change chuck.

Hose connection . . ¼" pipe

Ask for Bulletin No. 52



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CLEVELAND OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

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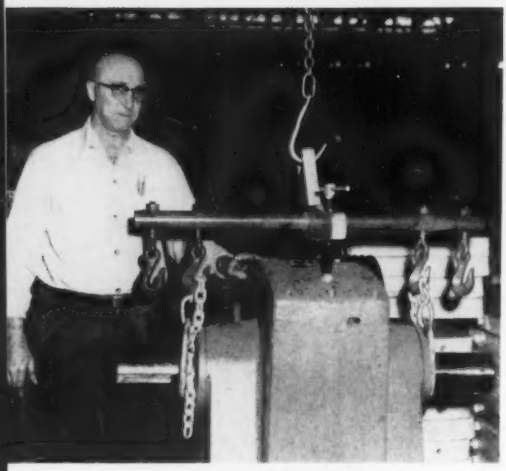


Illustration showing rig devised to facilitate lifting of reduction gears for pumping units

ing units manufactured at the Toledo plant of The National Supply Company. The shape of the gears and the fact that they are much heavier on one side than the other made them difficult and dangerous to lift, even when several chains were wrapped around each piece.

The device consists of a bar with four hooks, two near each end. The chains which support the load can be positioned on the bar so as to distribute the load evenly, overcoming the effect of the extra weight at one end. The time required to move the gears has been reduced 50 per cent by the use of this device.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

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Shuregrip BORING BARS



DOUBLE END 30° & 90°

Number	1-A	2-A	3-A	4-A	5-A	6-A	7-A
Bar. Dia. In	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2
Length In	7	8	9	11	13	18	23
Cutter In	1/8 Rd.	5/16 Rd.	3/8 Sq.	1/4 Sq.	5/16 Sq.	3/8 Sq.	1/2 Sq.
Price Each	1.95	2.10	2.95	3.25	4.55	10.75	20.80

SINGLE END 30° & 90°

When Ordering—State Angle Required

Number	1-B	2-B	3-B	4-B	5-B	6-B
Bar. Dia. In	3/8	1/2	5/8	5/8	3/4	3/4
Length In	3	4	5	7	8	10
Cutter In	1/8 Rd.	5/16 Rd.	3/8 Sq.	5/16 Sq.	1/4 Sq.	1/4 Sq.
Price Each	1.25	1.35	2.20	2.50	2.60	2.80

Adjustable Boring Bar holders available take bars from 3/8" up to 1 1/2" diameter. T-Blocks made to fit any lathe. Price list on request.

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BREAK OFF ON SCORE, AS REQUIRED

1-6" Length—1/8 Dia. H.S.S. Tool Bit Stock—Hardened—each 95¢
1-6" Length—5/16 Dia. H.S.S. Tool Bit Stock—Hardened—each $1.05
Round Tool Bits Furnished in 1-A, 2-A, 1-B and 2-B—All Others Square. 1 Hexagon Wrench Furnished with Each Bar.

Price of Square H.S.S. Cutter Bits.	5/16x1	1/4x1 1/4	5/16x1 1/2	3/8x1 7/8
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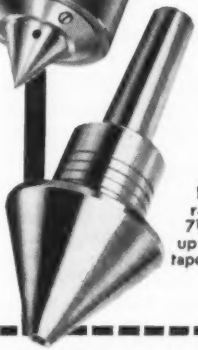
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PIPE POINT LIVE CENTER

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Abrasive Machine Tool Co., 20 Dunellen Rd., East Providence 14, R. I. Folder describing the No. M-34. Vertical Spindle Surface Grinder.

9. Abrasive Papers and Cloths

Illustrated 40-page catalog and price list (No. 23) covering Jewel Brand coated abrasive papers and cloths. Abrasive Products, Inc., South Braintree, Massachusetts.

10. Pin Oilers

Acro Metal Stamping Co., 338 E. Reservoir Ave., Milwaukee 12, Wis. 4-page bulletin describing line of pin oilers and die set pullers.

11. Relay Steels

Revised edition of its technical data sheet describing Allegheny relay steels. Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 22, Pennsylvania.

12. Hydraulic Cylinders

American Hollow Boring Co., Erie 4, Pa. 4-page folder describing American enlarged facilities for the manufacture of hydraulic cylinders to meet individual requirements.

13. Portable Hardness Testers

Illustrated 6-page catalog discussing portable hardness testers for quick, accurate, on-the-spot tests. Ames Precision Machine Works, Waltham 54, Massachusetts.

14. Welding of Stainless Tubing

The Babcock & Wilcox Co., Tubular Products Division, Beaver Falls, Pa. Technical data card (No. 162) describing welding of B&W Stainless Croloy Tubing and Pipe.

15. Detector Systems

Illustrated 8-page bulletin describing the Electro-Graphic Detector Systems for simplifying maintenance of complex electrical controls. W. F. & John Barnes Co., Electrical Division, 301 S. Water St., Rockford, Illinois.

16. Hand Stoned Cutting Tools

Behr-Manning, Dept. MS, Troy, N. Y. 12-page booklet showing why hand stoned cutting tools produce faster, better and economical cutting.

17. Copper Head Laps

Illustrated catalog covering standard and expansion copper head laps. Boyar-Schultz Corp., Dept. C-N, 2020 S. 25th Ave., Broadview (Chicago), Ill.

18. Vacuum-Melted Metals

Bulletin (No. VM-100) providing general information and technical data on vacuum-melted metals and alloys. Carboloy Department of General Electric Co., Detroit 32, Michigan.

19. Powder Metallurgy

Chrysler Corp., Amplex Division, Detroit 31, Mich. 4-page folder covering Steel Oilite, with high ductility and high impact resistance.

20. Cutter and Tool Grinder

The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. Illustrated 20-page catalog describing the Cincinnati No. 1 Cutter and Tool Grinder.

21. Drawing Press

Clearing Machine Corp., 6499 W. 65th St. Chicago 38, Ill. 16-page bulletin (No. 230) describing the "Clearomatic" Drawing Press.

22. Single-Point Presses

Illustrated 4-page catalog (No. 2019-A) covering a line of Steelweld Single-Point Presses. The Cleveland Crane & Engineering Co., 6457 E. 281st St., Wickliffe, Ohio.

23. Solid Carbide Taps

Walter T. Cole Co., 3217 Washington St., Phoenix, Arizona. 4-page bulletin discussing its line of solid carbide taps.

24. Broaching Machine

Illustrated 4-page bulletin (No. FW-55) describing the Colonial "4" Convertible Broaching Machine. Colonial Broach Co., Box 37, Harper Station, Detroit 13, Michigan.

25. Boring Tools

Comet Tool Co., 738 Broadway, New York 3, N. Y. 6-page folder describing its boring, facing and threading tools.

26. Precision Dowel Pins

Illustrated 4-page folder showing the company's complete line of precision dowel pins—both standard and oversize. Danly Machine Specialties, Inc., 2100 S. Laramie Ave., Chicago 50, Ill.

27. Precision Surface Grinders

The DoAll Co., Des Plaines, Ill. Illustrated 24-page catalog describing its line of precision surface grinders.

28. Locating Spotlight and Transformer

Illustrated 4-page catalog covering the No. 953-B universal locating spotlight and transformer. Engineering and Research, Division of ACF Industries, Inc., Riverdale, Maryland.

29. Welding Machines

Spiral bound, 54-page, comprehensive catalog describing its line of welding machines. Expert Welding Machine Co., 17144 Mt. Elliott Ave., Detroit 12, Michigan.

30. Special Dies

Federal Tool and Mfg. Co., 3600 Alabama Ave., Minneapolis, Minn. Costs bulletin (No. 101) showing how Federal's special dies give accuracy, exact duplication and close tolerances.

31. Special Storage Equipment

Illustrated 16-page brochure (No. 700) shows how to save space and time with special storage equipment. The Frick-Gallagher Mfg. Co., Wellston, Ohio.

32. Grinding Wheel Safety

Pamphlet listing 20 simple safety precautions which each grinding wheel user should check. Grinding Wheel Institute, 2130 Keith Bldg., Cleveland 15, Ohio.

33. Precision Tweezers

Grobet File Company of America, Inc., 421 Canal St., New York 13, N. Y. Catalog sheet describing its line of Swiss precision tweezers.

34. Automatic Coil Cradle

Illustrated 4-page bulletin covering the Medelton "Poweroll" Powered Automatic Coil Cradle. Wm. Halpern & Co., 100 Stevens Ave., Mount Vernon, N. Y.

35. Collet Selection Guide

Hardinge Brothers, Inc., Elmira, N. Y. Simplified guide for ordering collets.

36. Pickling Aids

E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa. Bulletin covering two pickling aids and an improved heavy-duty inhibitor.

37. Carriage Stop

Catalog sheet describing the "Precision-Stop" Multiple Position Carriage Stop. Edward Jentsch, Inc., 11 Penobscot St., Clifton, New Jersey.

38. Grinder Shield

Junkin Safety Appliance Co., 101 S. Floyd St., Louisville 2, Ky. Bulletin describing the Junkin Electro-Lock Shield which has been developed primarily as a point of operation guard.

39. Precision Machine Vise

Illustrated 4-page catalog describing the "Squar-Vise," a general utility precision machine vise. Kearsarge Tool & Mfg. Co., RD 3, Erie, Pennsylvania.

40. Cylindrical Grinders

Landis Tool Co., Waynesboro, Pa. 20-page catalog (No. B-54) covering its 10 and 14-inch plain hydraulic cylindrical grinding machines.

41. Dust Collectors

Leiman Bros., Inc., 149 Christie St., Newark 5, N. J. 4-page bulletin (No. 1455) illustrating and describing its improved line of polisher-grinder dust collectors.

42. Riveters and Dimplers

Illustrated folder describing "Airflex" Riveting and Dimpling Machines. Lemert Engineering Co., Inc., 206 E. Jefferson, Plymouth, Indiana.

43. Iron Powder Electrodes

The Lincoln Electric Co., Cleveland 17, Ohio. "Iron Powder Electrodes and Their Application," a reprint of a paper given before the American Welding Society by Jerry Hinkel, application engineer for Lincoln Electric.

44. Milling Cutter Arbors

Illustrated 8-page catalog describing its complete line of milling cutter arbors. Lovejoy Tool Co., Inc., Springfield, Vermont.

45. Tap Holder

Marcellus Mfg. Co., Belvidere, Ill. Illustrated catalog sheet on the Marcellus Releasing-Type Tap Holder.

46. Feed Units, Tapping Units

Michigan Drill Head Co., P.O. Box 4643, Detroit 34, Mich. 24-page catalog describing feed units, tapping units, hydraulic drill presses, and fixed center and adjustable center drill heads.

47. High Speed Gear Hobber

Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. 8-page bulletin (No. LH-54) describing the Model 1445 Ultra-Speed Gear Hobber.

48. Micro Drill Guides

Illustrated catalog sheet describing micro drill guides. Micro Drill Guide, Division Jessup Engineering & Development Co., 3980 Superior Ave., Cincinnati 36, Ohio.

49. Barrell Degreaser

Illustrated 4-page catalog describing the Model 5BD-G Baronet Barrel Degreaser. P. K. Neuses, Inc., 1103 W. Euclid Rd., Arlington Heights, Illinois.

50. Slitting Machine Opeartion

Illustrated 28-page manual on slitting machine operation which is intended to be a basic guide for new operators. The Ohio Knife Co., Dept. HH-36, Cincinnati 23, Ohio.

51. Portable Grinders

Onsrud Machine Works, Inc., 3924 Palmer St., Chicago 47, Ill. 4-page bulletin (No. 1129) describing its air turbine portable grinders.

52. Tooling for Welding

Cecil C. Peck Co., 14901 Woodworth Rd., Cleveland 10, Ohio. 40-page brochure describing standard and special tooling for welding.

53. Precision Punches

Pivot Punch & Die Corp., Dept. MM, North Tonawanda, N. Y. 20-page catalog (No. 548) describing its line of precision punches and piercing accessories.

54. Ball Bearing Arbors

Illustrated 8-page catalog describing bench grinders, ball bearing arbors and sanding discs. Poly Products Co., 230 E. Pomona Ave., Monrovia, Calif.

55. Automatic Gear Hobbers

Illustrated bulletin (No. 156) describing Newark Automatic Gear Hobbers. Potter & Johnston Co., Pawtucket, Rhode Island.

56. Hand Engravers

H. P. Preis Engraving Machine Co., 657 U. S. Route 22, Hillside, N. J. 4-page bulletin describing Models UM-T and CNP Engravers.

57. Direct Current Motor

Reliance Electric and Engineering Co., 1076 Ivanhoe Rd., Cleveland 10, Ohio. Bulletin (No. C-2002) on the Super "T" Line D. C. Motor.

58. Air Valves

Illustrated 12-page catalog section (No. 303) covering its line of air valves. Rivett Lathe & Grinder, Inc., Dept. MMS, Brighton 35, Boston, Mass.

59. Torque Drivers for Taps

Illustrated 6-page bulletin (No. 20-50) describing Scully-Jones Safe-Torque Drivers for taps. Scully-Jones and Co., 1909 S. Rockwell St., Chicago 8, Ill.

60. Tumbling Abrasive

Simonds Abrasive Co., Tacony and Fraley Sts., Philadelphia 37, Pa. 4-page catalog (No. ESA-236) covering Borolon Tumbling Abrasive.

61. Electric Valves

Catalog discussing the five basic Skinner electric valves and their possible variations. Skinner Electric Valve Division, The Skinner Chuck Co., 210 Edgewood Ave., New Britain, Conn.

62. Precision Turret Lathes

South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind. 4-page bulletin (No. 5502) describing its No. 2-H Precision Turret Lathe.

63. Precision Tooling

Illustrated 464-page anniversary catalog covering its line of precision tools. The L. S. Starrett Co., Athol, Mass.

64. Work Benches

Sturdi-Bilt Steel Products, Inc., 2501 Peterson Ave., Chicago 45, Ill. 16-page catalog (No. 155) describing work benches, shop aids and accessories, machine stands, assembly stands and bins.

65. Sine Angle Plates

Illustrated 4-page catalog (No. 812) pertaining to sine angle plates and sine angle magnetic chucks. The Taft-Peirce Mfg. Co., Woonsocket, R. I.

66. Wheel Dressers

Thompson Mfg. Co., Erie, Pa. Bulletin describing the No. 515 open-side emery wheel dresser and the No. 815 "Red Ruffiing" grinding wheel dresser.

67. Profile Grinder

Illustrated 4-page bulletin (No. TPG-3) covering the No. 3 Tangent-Arc Profile Grinder. Union Twist Drill Co., Athol, Massachusetts.

68. Vertical Milling Machine

The U. S. Burke Machine Tool Division, 3 Brotherton Rd., Cincinnati 27, Ohio. Catalog describing the U. S. Vertical Drilling Machine.

69. Carbide Tips

Illustrated 33-page catalog covering carbide tips, tools, throw-away blanks and holders. Valenite Metals Corp., Box 205, Royal Oak, Michigan.

70. Open Back Presses

Verson Allsteel Press Co., 9310 S. Kenwood Ave., Chicago 19, Ill. 12-page catalog (No. OB-54) describing its line of open back presses and horn presses.

71. Carbide Blanks

Illustrated 121-page catalog (No. 541) covering the line of Wessonmetal carbide blanks and Wesson carbide cutting tools. Wesson Co., 1220 Woodward Heights Blvd., Ferndale 20, Michigan.



BURGMASTER* TURRET DRILLS

with POWER INDEXING

"Without the BURGMASTERS our costs to produce this part would have been almost prohibitive"

REPORT FROM:

AMPEX CORPORATION

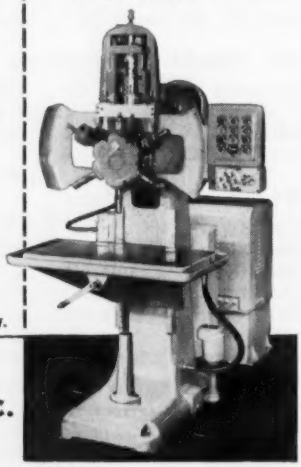
REDWOOD CITY, CALIF.

ROLF J. GRUENSTEIN, Sup't. of Fabrication

In the fabrication of Ampex CinemaScope Sound Systems used in theaters all over the world, one casting requires 42 separate drilling, tapping, reaming or counterboring operations. This includes drilling holes from #57 (.043 inches) to 3/4 of an inch, and reaming holes to 1/2 inch with extremely critical dimensions on size and alignment. Without the BURGMASTERS our costs to produce this part would have been almost prohibitive. Other equipment to fill the same need would have been much more expensive and much less versatile for our type production.

We have found the following qualities of the BURGMASTER to be of definite advantage in the manufacture of Ampex CinemaScope Sound Systems and Ampex Magnetic Tape Recorders. High Precision. Wide range of preselected speeds. Large adjustable work table. Low maintenance cost. Minimum time and effort required for set-up.

Available in 6 spindle manual; 6 and 8 spindle, hydraulic, automatic models. All BURGMASTERS feature power indexing, pre-selective spindle speeds, very close pre-selective depth control.



Write for Bulletin No. MM-4

*T.M. Reg. U.S. Pat. Off.

BURG TOOL
MANUFACTURING COMPANY INC.

P.O. BOX 48, GARDENA, CALIF.

For more data circle **400** on Reader Service Card



NO SHERLOCK HOLMES IS NEEDED TO FIGURE OUT

WHY A·B·C DRILL JIG BUSHINGS ARE PREFERRED

wherever highest engineering standards must be met!

Here are facts which must interest every tool engineer:

- A·B·C Bushings are made from only chromium or chromium-tungsten oil hardening tool steels having wear resistance 18.5% above that of regular carbon water hardening tool steels.
- They are heat treated, including quenching, in a neutral atmosphere, electronically controlled, and under automatic timing. This extra precaution insures high wear resistance *right out to the initial working surface.*
- Their dimensional precision is insured by exacting inspection, including air gauging — plus the most modern honing and grinding equipment.
- All this adds up to *unexcelled accuracy and concentricity,* and *approximately 20% longer service* — 100% good right from the start.



A·S·A STANDARD

A·B·C Bushings include
Headless Press Fit • Slip Renewable • Fixed Renewable
Head Press Fit • Headless Liners • Locating Jigs
Lockscrews and Clamps

Catalog and price list sent on request. The former includes information needed by every tool engineer

Representatives and stocks in strategic industrial centers

ACCURATE BUSHING COMPANY

Department M-M-S *Main Office and Factory*

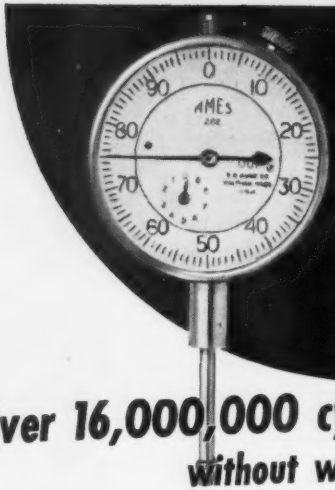
447 North Avenue, Garwood, New Jersey • WEstfield 2-6400

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AMES



...the preferred
Dial Indicators

Over 16,000,000 cycles without wear or loss of accuracy . . . how many more will they complete?

Several Ames Model 282 Long Range Dial Indicators *with plain bearings* are currently giving an amazing demonstration of performance and endurance under test conditions. After more than 16,000,000 cycles each, at 240 strokes per minute, 9 hours a day—they still have their original accuracy!

The reasons for this outstanding record? Simply high quality materials, simple basic design, rugged construction . . . and expert craftsmanship.



If you would like to have our recommendations on your measurement problem, send blueprints and specifications. And ask for your free copy of our catalog on Ames micrometer dial indicators and gauges.

Representatives in principal cities

B. C. AMES CO. *29 Ames Street Waltham 54, Mass.*

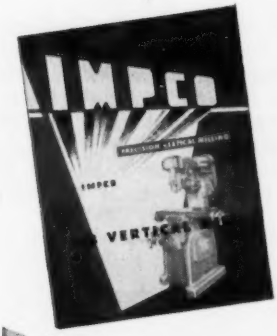
Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

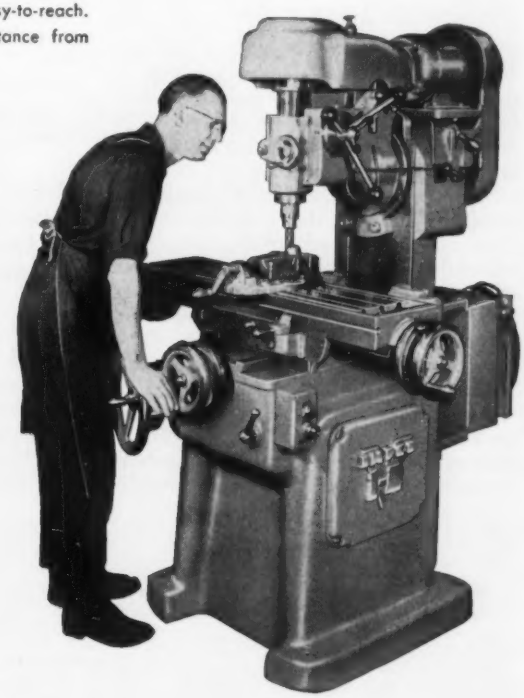
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Here's New Operating Ease in a Vertical Mill

- The head of the IMPCo Model 1-B Vertical Mill is *vertically* adjusted by a counter-balanced ram. The table does NOT move vertically.
- A Shot-Pin gives positive vertical spindle alignment after angular milling operations *without indicating the table.*
- Controls are centralized, easy-to-reach. They remain the same distance from the floor at all times.
- Dials are extra-large, easy-to-read for greater accuracy and operating ease.
- One shot lubrication system.

Get all the facts. Write for Bulletin MM-103.





IMPCO

INDUSTRIAL METAL PRODUCTS CORPORATION

Builders of IMPCo Straighteners, the American HEB Pilot Lathe, and Special Machinery

3412 W. ST. JOSEPH STREET **LANSING, MICHIGAN**

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news of the industry

news of the industry

New plants . . . new warehouses . . . company mergers . . . new appointments . . . honors and awards

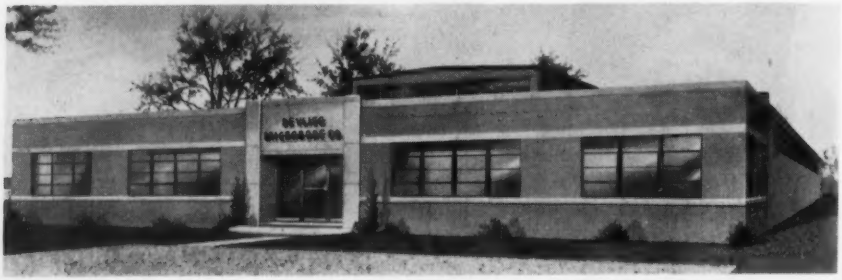
DEVLIEG MICROBORE COMPANY COMPLETES NEW PLANT

C. B. DeVlieg, president of DeVlieg Microbore Company, has announced that their new plant, recently completed at 2720 West Fourteen Mile Road in Royal Oak, Michigan, is now occupied by the company and is operating at peak production. According to company officials, the operation was so thoroughly planned that production schedules were maintained almost without interruption while transferring from the former plant at 480 Fair Avenue in Ferndale, Michigan. The new building, incorporating many innovations in design and construction, utilizes 15,000 square feet of floor space to accommodate the fifth Microbore expansion in five years. Existing plans include provisions for an early addition to the present structure to meet the continually increasing demand for the firm's products. The 27-acre site is easily accessible from Detroit and neighboring cities. A spacious parking area adjoining the building is provided for the use of visitors and employees.

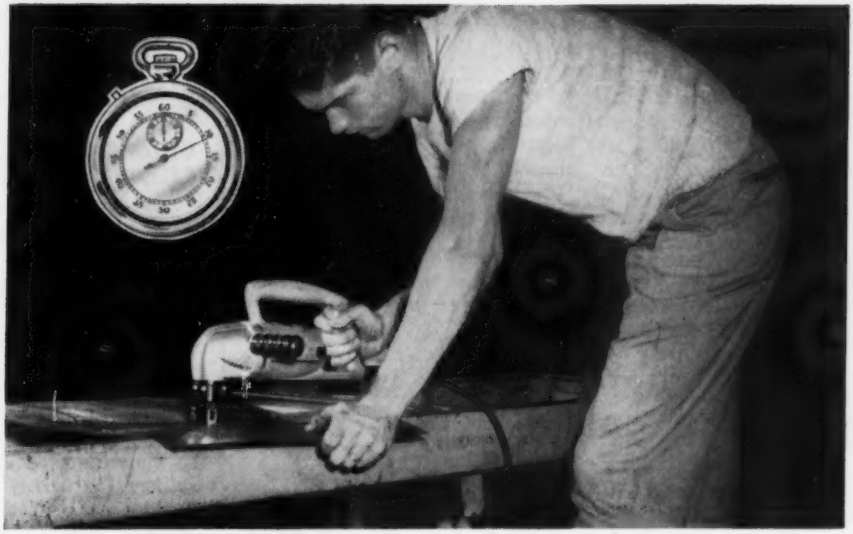
★ ★ ★

PRODUCTO OPENS NEW BRANCH ASSEMBLY WAREHOUSE IN PHILADELPHIA AREA

The Producto Machine Co., Bridgeport, Conn., has opened a modern new branch assembly warehouse in the Philadelphia area to provide a faster die set service for that city, eastern Pennsylvania and southern New Jersey. The new warehouse is located at 214 Rock Hill Rd., Bala Cynwyd



New manufacturing plant of DeVlieg Microbore Company located in Royal Oak, Michigan



New SKIL Shear Sweeps Field in Actual Comparison Tests!

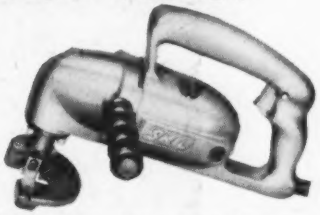
SKIL Model 231 Wins 5 Trials Out of 5! Outperforms, Outproduces ALL Others

Actual tests prove what many sheet metal men are learning for themselves. The new SKIL 231 Shear is far superior to all others on the market. These tests show the speed, power, and control that are making the SKIL Shear so popular on every job . . . in every shop.

Five tests—measuring speed, circle cutting speed, tightness of circular cuts, cleanness of cut and power—prove SKIL is in front of all others.

SKIL
PORTABLE TOOLS

Made only by SKIL Corporation
formerly SKILSAW, Inc.
5033 Elston Avenue, Chicago 30, Illinois
3601 Dundas Street West, Toronto 9, Ontario
Factory Branches in All Leading Cities



SKIL SHEAR 231—Best All-Around

The results show that the 231 is the best all-around Shear on the market today. Faster, easier handling, more powerful! Features like the Contour Grip Handle at the rear of the tool make it a favorite with workmen who have tough cutting to do. Improved foot design keeps maintenance costs down for job superintendents. This is the shear you need in *your* shop. The SKIL Model 231.

Contact Your SKIL Distributor—or Your Nearby Factory Branch—for Complete information.

For more data circle **404** on Reader Service Card

(Philadelphia), Pa. J. Brandon Shaw, who has had 10 years of sales experience with Producto, has been named branch manager. This branch will stock and assemble Producto die sets, as well as a complete line of die accessories including guide pins and bushings, dowel pins, chrome-vanadium die springs and feeding equipment. In addition, it will carry Producto machine vises and hand tappers.

★ ★ ★

MICHIGAN TOOL COMPANY MERGES WITH EX-CELL-O

Confirming the merger with Ex-Cell-O Corp., Detroit, Mich., Marvin R. Anderson, executive vice president of Michigan Tool Company, emphasized that the exchange of stock involves no basic changes for either Michigan Tool or its Canadian subsidiary, Colonial Tool Company, Limited. The companies, although wholly - owned subsidiaries of Ex-Cell-O, will be indepently operated under the same management as previously. H. Glenn Bixby, Ex-Cell-O president, has announced that the Ex-Cell-O board of directors has been enlarged from seven to nine members, with the newly created positions being filled by the appointment or Oscar L. Bard, Michigan Tool president, and Earl E. Conlin, secretary and treasurer of Ex-Cell-O.

DEBURRING - -
another
SCHAUER SPEED LATHE job!

These are versatile, economical machines for handling an almost *unlimited* variety of secondary finishing work—deburring, filing, lapping, polishing, etc.—on metal and plastic parts.



Used by leading manufacturers all over the world for increasing production UP TO 90%. Many sizes and models with chuck, collet, expanding mandrel, vacuum chuck and other holding fixtures. Speed *your* production with Schauer Speed Lathes. Get complete information today.

WRITE FOR BULLETIN 500.

SCHAUER MANUFACTURING CORP.

4501 Alpine Ave., Cincinnati 36, Ohio

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a practical approach to pressroom modernization

Announcing

TWO NEW Verson PLANS

to solve press obsolescence problems

The extensive capital expenditures required to meet competitive pressures have put many manufacturers in an unfortunate position. Modernization is necessary if the manufacturer is to price his product competitively and still make a fair profit. However, the fair profit is necessary before he can afford the modernization. Two new Verson plans make it possible to modernize now and pay for it out of the increased profits it provides. If you are one of the manufacturers faced with the dilemma of needing modernization for better profits, but needing better profits before you can afford modernization, one of these plans may be the answer to your problems.

Customized

INSTALLMENT PROGRAM

For the manufacturer who wishes to own his own presses but minimize his initial capital outlay, Verson offers a Customized Installment Program. It is called "Customized" because the payment plan is tailored to the buyer's own financial requirements rather than to a single fixed plan. Initial payments may be as low as 10 per cent of the purchase price with the balance payable over periods ranging from six months to five years. Further information on a plan to meet your needs will be furnished on request. Please outline your requirements.

Customized

LEASING PROGRAM

For the manufacturer who wants the advantages of modern, efficient presses without capital investment, Verson offers a Customized Leasing Program. Like the Installment Program, a choice of plans is available to best suit the buyer's requirements. In addition to the basic plans, options for continuation, termination and eventual purchase are also available. Special arrangements for special machines will be considered. Further information on a leasing plan to suit your needs will be furnished on request. Please outline your requirements.

A Verson Press for every job from 60 tons up.

Verson

ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION

VERSON ALLSTEEL PRESS CO.

9310 S. Kenwood Avenue, Chicago 19, Illinois
So. Lamar at Ledbetter Drive, Dallas, Texas

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES
TOOLING • DIE CUSHIONS • VERSON-WHEELON HYDRAULIC PRESSES

For more data circle **406** on Reader Service Card

news of the industry . . .

Michigan Tool Company operates three plants in Michigan, as well as its subsidiary in Windsor, Canada. The plants in Michigan are located in Detroit, Manistee and Traverse City. The Michigan plants produce gear cutting, finishing and gaging equipment, as well as special tools in that line. Michigan Tool also produces a line of geared power transmission units and speed reducers. These products complement Ex-Cell-O's machine and tool items and are not competitive with standard Ex-Cell-O products. The Canadian subsidiary manufactures cutting tools and broaches, which at present are not produced by Ex-Cell-O of Canada.

★ ★ ★

SPS ACQUIRES NEIGHBORING PLANT

Standard Pressed Steel Co., Jenkintown, Pa., took possession of the neighboring 100,000 square-foot plant of the Harry A. Prock Cabinet Company, acquired under a recently concluded purchase agreement. For SPS, it is the second major expansion in as many years. Early in 1954, the company completed a $10,000,000 new plant and machinery program which doubled the floor space to 650,000 square feet. The Prock plant, which lies several hundred feet south of the SPS plant and across the line in neighboring Glenside, is being used by SPS for storage and warehousing. Some office space is also being utilized.

Standard Pressed Steel Company said that the plant was acquired principally to provide expansion space for its growing business requirements. The Harry A. Prock Cabinet Company,



COLLIS COLLET EQUIPMENT

★ COLLIS Equipment fills today's important production needs so well because they are made by men skilled in making this type of equipment. Supply the proper unit from a complete range of types and sizes for Drill Sleeves and Sockets, Lathe Centers, Chuck Arbors, and Drill Drifts. We will handle your orders promptly.

THE COLLIS COMPANY
DEPT. A, CLINTON, IOWA

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Portable Sandblast Gun
—Complete— simply connect to air line



Rugged • Efficient • Guaranteed $27.50

A Real Performer Handy in any shop

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LINDBERG PRODUCTS CO.,

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SIMONDS ABRASIVE CO.

CENTERLESS GRINDING WHEELS

Field Surveys repeatedly prove the high performance of these wheels. They cut free, hold their shapes to give fast, top volume production. Write for bulletin ESA 55.

SIMONDS ABRASIVE COMPANY · PHILADELPHIA 37, PA.

Branch Warehouses: Boston, Detroit, Chicago, Portland, San Francisco • Distributors in Principal Cities
Division of Simonds Saw and Steel Co., Fitchburg, Mass. • Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y., Simonds Canada Saw Co., Ltd., Montreal, Quebec, Lion Grinding Wheels Div., Brockville, Ont. and Simonds Canada Abrasive Co., Ltd., Arvida, Quebec

EXTRA SAVINGS FROM YOUR SIMONDS DISTRIBUTOR
STOCK · SERVICE KNOW-HOW



Plant of the Harry A. Prock Cabinet Company, Glenside, Pennsylvania, which was recently purchased by the Standard Pressed Steel Company of neighboring Jenkintown, Pennsylvania

which occupied the site for 21 years, has terminated its business. The Prock plant is a modern two-story brick building with reinforced steel members, most of which was constructed within the last three years. It stands on a four-acre property served by a Reading Railroad siding.

CROSS COMPANY ELECTS OFFICERS

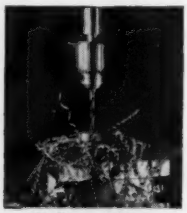
The Cross Co., Detroit, Mich., has announced that Herbert M. Shilson has been elected to the board of directors to replace the late Milton O. Cross, Sr. At the same time, Kurt O. Tech,



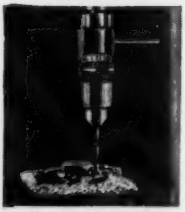
SHALLOW HOLES...DEEP HOLES
DRILL THEM FASTER, ALL BETTER
WITH A Commander
DRILL CHIP BREAKER

✓ Small Chips Permit 50%—400% Increase in Drilling Speeds
✓ Drill 10 Diameters or More in Depth Without Clearing Drill
✓ Better, Smoother, More Accurate Holes

Reciprocating action of the Commander Drill Chip Breaker breaks chips into small pieces that travel up drill flutes . . . permitting higher drilling speeds . . . doubles and triples production of shallow OR deep holes. Long chips which cause drill breakage, scored holes, slow jig and fixture loading, are eliminated—small, easy to handle chips flow up out of hole continuously, permitting coolant to reach cutting edge of drill. Assures longer drill life, more holes per sharpening, more holes per hour. Your nearby COMMANDER Distributor has the Drill Chip Breaker and other Commander Production Tools.



Ordinary Chips



Chip Breaker Chips

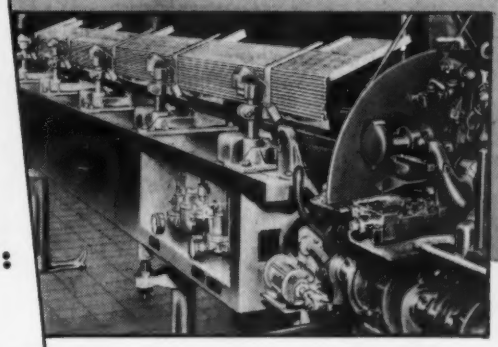
Commander MFG. CO.
4224 W. KINZIE STREET • CHICAGO 24, ILLINOIS

Write FOR CATALOG #851
which describes Commander's Production Tools

For more data circle 410 on Reader Service Card

Now . . . A Screw-Machine-Feed that BREAKS THE TIME BARRIER!

Steps Up PRODUCTION to the Continuous Flow of the FOURTH DIMENSION: TIME



Every time a screw machine cuts air . . . every time feed fingers are adjusted or replaced . . . every time remnant removal forces a shut-down—*that's time lost forever, never again to be made up in the production quota!*

In the modern Lipe Automatic Magazine-Loading Bar Feed, we present a continuous-feed mechanism that utilizes EVERY MINUTE of the working day for production . . . and still more production.

There's NO cutting air. NO feed fingers. NO remnant problem. NO minimum or maximum run. NO limit on length of feed. NO selective stock length requirement.

There IS a definite increase in production—up to 100% on some installations—AT LEAST 30% ON EVERY ONE!



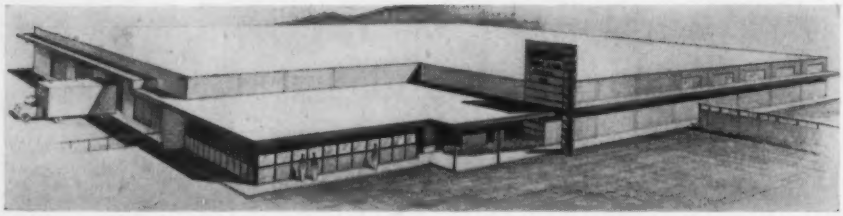
Bring your stopwatch to the ASTE Show, Booth No. 726, where you can clock a Lipe AML Bar Feed in action. If you can't make the Show, write for *free booklet, "TIME—the Important 4th Dimension of Production and Profit."*

LIPE ROLLWAY

Lipe-ROLLWAY CORPORATION

Manufacturers of Automotive Clutches and Machine Tools

Syracuse 1, N. Y.



Wash drawing of new Portland, Oregon, warehouse of Simonds Saw and Steel Company

chief engineer of the company, was added to the board, and Milton O. Cross, Jr., Ralph E. Cross and Clark Bennett were re-elected. Milton O. Cross, Jr., was renamed president; Ralph E. Cross, executive vice president and secretary; Clark Bennett, treasurer and director; and Herbert M. Shilson, assistant secretary and comptroller.

SIMONDS TO BUILD LARGER NORTHWEST BRANCH WAREHOUSE

Simonds Saw and Steel Co., Fitchburg, Mass., has broken ground for a new building on the Banfield Expressway at 66th and Halsey Streets in Portland, Oregon. According to company officials, this expansion program

★ ★ ★ ★ ★

Save Time . . . Labor . . . Materials with



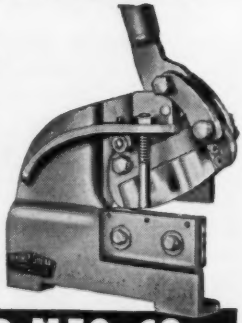
Inside SLOTTER

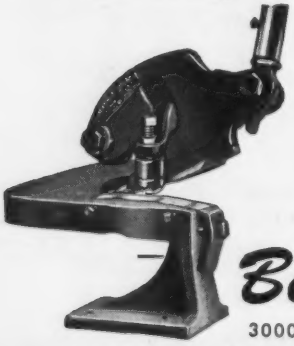
Make cuts up to 8" inside edge of sheet. Sharp, clean burr-free cuts always assured. Cap. 16 ga. High strength aluminum alloy body; H.C.H.C. blades.

BEVERLY metal cutting SHEARS

Throatless SHEAR

Make any cut—straight, irregular, curved. Exclusive design permits turning work any direction while cutting. 4 models—capp. to 3/16".





Slitting SHEAR

New "55" Series — easier cutting with compounded linkage. 3 models—cap. to 3/16"; trimming capacity to 5/16" mild.

See your Beverly Distributor. Write for FREE Illustrated Bulletin.

Beverly SHEAR MFG. CO.

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For more data circle 412 on Reader Service Card



Putnam takes the shank off the end mill . . .

. . . puts it on a holder that soon pays for itself.

Postiv-Lok adapters simplify change-over to small end mills, shell end mills and drills.

Eliminate integral tapered shanks and cumbersome tool changing on heavy end mill jobs with the new, proven Postiv-Lok end mills. They'll cut your end mill costs up to 25%, give smooth, chatter-free cutting through torque-aided locking. Write for catalog on your letterhead.

PUTNAM
TOOL COMPANY
2981 CHARLEVOIX AVENUE • DETROIT 7, MICHIGAN

For more data circle **413** on Reader Service Card

is in step with the tremendous growth of all types of industry served by Simonds in the Northwest and is designed to meet the ever increasing demand for additional local saw manufacturing and repair facilities. Replacing the outgrown office, warehouse, manufacturing, sales and service facilities now located at 311 S. W. First Avenue, the new building will be constructed on a three-acre site and will have 60,000 square feet of floor space, all on one level, with truck loading and receiving docks, a rail siding and large adacent parking facilities.

At the new location, ample space will be provided for additional saw manufacturing and repairing equipment and for increased stocks of Simonds saws, knives, files and grinding wheels.

★ ★ ★

CUTTING TOOL MANUFACTURERS ASSOCIATION ELECTS OFFICERS AND DIRECTORS

At its 11th Annual Meeting held recently at the Detroit Yacht Club, the Cutting Tool Manufacturers Association elected Howard R. DeVlieg, of DeVlieg Microbore Company, president of the association. Leonard H. Skoglund, Jr., Scully Jones and Company, was elected vice president, and R. S. Spencer, Detroit Boring Bar Company, was re-elected treasurer. Martin J. Ewald was re-elected executive secretary of the association. Directors elected for a three-year term were: E. J. Kaiser, Giddings & Lewis Machine Tool Company; Mr. Spencer;

RAYMAC *Solid Carbide*
DRILLS and REAMERS
Raymac drills cut hardened metal . . . do not burn or anneal. Feature operational speeds of 350 to 600 RPMS depending on size and hardness of metal.
Raymac solid carbide reamers are custom designed for individual jobs.
Write for catalog No 12
RAYMAC
MANUFACTURING COMPANY INC.
3729 CASS AVENUE, DETROIT 1, MICH.

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LUERS
PATENTED CUTTING OFF TOOL HOLDERS
PATENTED CUTTING OFF BLADES
ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.
Manufactured by
J. MILTON LUERS. 12 Pine Street, Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

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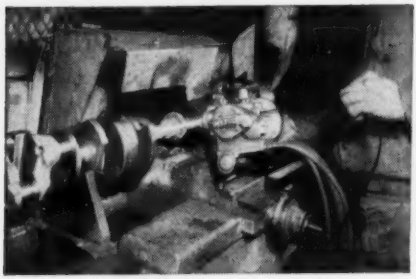
when mistakes happen...

...and they do in any busy machine shop, there's no need to scrap a mis-machined or otherwise damaged machine part that represents an investment of many expensive man-hours.

Parts like these are brought up to inspection standards quickly, easily and inexpensively with metallizing.

And with the new molybdenum metallizing wire, Sprabond, the only surface preparation required is cleaning. The molybdenum forms a molecular bond with the surface being rebuilt. Little heat is generated, eliminating any danger of warpage.

What's more—users have found that the extreme hardness of the molybdenum coating, and its microscopic porosity which provides superior lubricating characteristics, improve its "wear-ability" over ordinary bearing surfaces as much as 25 times. **You haven't just salvaged a part—you've improved it.**



Automotive crankshaft being brought up to inspection standards with metallizing. This automotive manufacturer formerly used plating for this type of salvage, worked one per hour. With metallizing, the salvage operation requires only 5 to 10 minutes per shaft, including surface preparation.



Free Bulletin

Get the full story on metallizing in production salvage. Bulletin 57-C describes and illustrates the procedures, provides data on typical parts, with interesting photo-micrographs showing the unique bonding action of Sprabond Wire. Send for a copy.

The trade name, SPRABOND WIRE, is the property of Metallizing Engineering Co., Inc.

DON A. WATSON
METALLIZING ENGINEERING CO., INC.
1111 Prospect Ave., Westbury, Long Island, N. Y.

☐ Please send me Bulletin 57-C.

☐ Please have Metco Field Engineer call.

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METCO

Metallizing Engineering Co., Inc.

1111 Prospect Ave., Westbury, L. I., New York • cable: METCO

In Great Britain:
METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

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FRANKENMUTH 9, MICHIGAN

For more data circle **417** on Reader Service Card

news of the industry . . .

F. H. Willey, Willey's Carbide Tool Company; and William Morse, Jr., Tool Specialties Company.

★ ★ ★

DEVELOPMENT OF TITANIUM TENSION BOLT ANNOUNCED BY SPS

Fabrication of lightweight titanium bolts of unusually high strength was announced recently by Standard Pressed Steel Co., Jenkintown, Pa. The development of what is believed to be the first successful titanium tension bolt was made known by SPS president, H. Thomas Hallowell, Jr., after production bolts — end products of a 30-month crash research program at SPS — had been shipped to the Aircraft Production Resources Agency at Wright-Patterson Air Force Base, to



"Hi-Ti" Titanium Bolts being examined by H. Thomas Hallowell, Jr., president of Standard Pressed Steel Co., Jenkintown, Pennsylvania

cut equipment costs with exclusive



Strandflex 4 & 5 speed gear drive FLEXIBLE SHAFT MACHINES

Put one motor to work for ROTARY FILING, GRINDING, BRUSHING, SANDING, DRILLING, POLISHING, BUFFING, AND CLEANING.

ONE *Completely Portable* COMPACT UNIT can be easily moved from job to job. In use, the operator lifts only the lightweight handpiece, not the heavy motor . . . thus reducing fatigue. Push-button tool changes all but eliminate change-over time.

A FLICK OF THE FINGER gives you any of 4 or 5 operating speeds ranging up to 12,000 RPM. Strandflex Gear Drive provides faster speed selection by eliminating countershafts, drive belts and pulley changes. Wider speed range lets you use Strandflex for more jobs, too.

QUICK-CHANGE COUPLING lets you change tools with a simple PRESS - PULL - SNAP action without using wrenches. Strand shafts and attachments are designed for tough use, even in hard-to-get-at jobs as well as production work.

NEW CATALOG describes FULL LINE of Strand Flexible Shaft Machines, including direct drive and countershaft models with up to 3 HP; also accessories and tools. See your distributor or write direct for catalog C-210B.



FRANKLIN BALMAR CORPORATION

N. A. STRAND DIVISION
Woodberry, Baltimore 11, Maryland
5001 N. Wolcott Ave., Chicago 40, Ill.

For more data circle **418** on Reader Service Card

the Navy's Bureau of Aeronautics and to 18 leading airframe and aircraft engine manufacturrers in the United States and Canada.

While weighing only 57 per cent as much as its steel counterpart, the new fastener, called "Hi-Ti" by SPS, makes feasible the use of titanium bolts in critical tension applications on aircraft. Weight saving without loss of strength can range as high as 1,000 pounds in a single airplane.

★ ★ ★

DR. MERCHANT RECEIVES CINCINNATI'S OUTSTANDING ENGINEER AWARD

Dr. M. Eugene Merchant, assistant director of research of The Cincinnati Milling Machine Co., Cincinnati, Ohio, was the recipient of the 6th Annual Outstanding Engineer Award which was recently presented by the Technical and Scientific Societies Council of Cincinnati at its 20th annual joint meeting. The award reads, in part: "the Technical and Scientific Societies Council of Cincinnati, after due consideration and upon unanimous selection of its award committee and board of judges, does honor M.



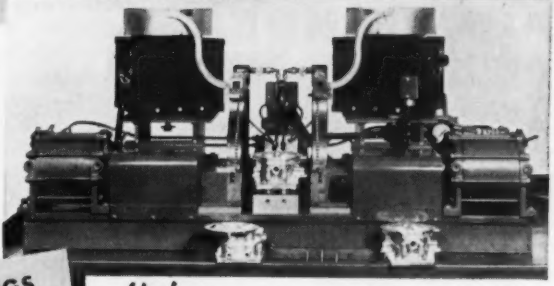
Dr. M. E. Merchant



For more data circle **419** on Reader Service Card

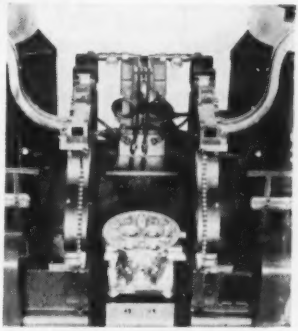
4 to 1 PRODUCTION

4 to 1 Time Saving!
4 to 1 Cost Reduction!
4 to 1 Labor Saving!
OVER PREVIOUS *Hand* PRODUCTION!



4 BRONZE BUSHINGS INSERTED INTO 4 BARREL CARBURETOR CASTINGS—

Using **DPS** VIBRATORY BOWL FEEDERS



● The bushings are fed from two DPS Bowl Feeders and transferred into four opposed tracks, bringing the bushings into alignment . . . Operator simply places the castings over locating pins in the fixture and cycles the machine by means of a foot switch. Air actuated rams come forward, pick up two bushings on each side and press them to the proper depth with one stroke, previously an individual hand operation. Machine cycle, two seconds.

How about YOUR Assembling Method?

● DPS has solved this and thousands of other bottlenecks through the use of their POWER SCREWDRIVERS, PARTS FEEDERS and SPECIAL MACHINES. We can do the same for you. Tell us your problem.

DETROIT POWER SCREWDRIVER CO.

2807 W. FORT ST. DETROIT 16, MICH.

For more data circle 420 on Reader Service Card

HIGHER SPEEDS!
FASTER GRINDING!

kipp

AIR GRINDERS

MODEL JA
50,000 R.P.M.
$42.00
IN U.S.A.



Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

kipp

MADISON-KIPP CORP.
208 Waubesa St., Madison 10, Wis., U.S.A.
For more data circle 421 on Reader Service Card

Eugene Merchant, physicist and engineer, and recognizes the advancements in scientific knowledge and the benefits to industry achieved through his original research in friction, lubrication and metal cutting; and the high character of his work for the enhancement of his profession and the upbuilding of his community."

The recipient of this award is chosen from among the 6,000 members of the affiliated technical societies on the basis of their contribution to scientific, engineering or technical knowledge, and their contribution to human welfare.

★ ★ ★

LIMA ELECTRIC MOTOR EXPANDS PLANT

The Lima Electric Motor Company has announced that it is expanding its main manufacturing plant and is increasing its production facilities at Lima, Ohio. H. E. Reeder, president of the firm, has announced that construction is underway and is scheduled for completion in approximately three months. The company's major products are heavy-duty industrial electric motors, selective speed machine tool drives and speed reducers.

★ ★ ★

LODGE & SHIPLEY AND H-P-M MERGER ABANDONED

The Hydraulic Press Mfg. Co., Mt. Gilead, Ohio, and The Lodge & Shipley Co., Cincinnati, Ohio, have announced that the plan of merger recently approved by the respective companies had been abandoned and would not be submitted for stockholder approval. The determination to abandon the merger was made by the boards of directors and chief executive officers of each company.



spot the champ

. . . and with high speed steels the champion's always REX

Compare the freckles and you'll pick the champ. And it's easy to spot the champ in high speed steels, too, for Crucible REX® has been the *standard of comparison* for over half a century.

Prove the reasons for REX's superiority in your own shop. You'll like its hardenability . . . response to heat treatment . . . fine tool performance. Like thousands of other users, you'll agree *you can't find a high speed steel to outperform REX.*

Ask for REX, a *prescription-made* Crucible product, at Crucible warehouses or leading distributors from coast to coast. *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 30, Pennsylvania.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

For more data circle **422** on Reader Service Card



delivers a

Sunday punch

every 3 seconds

Light weight in proportion to its tremendous punching capacity, the CP 25-ton Hydraulic Punch can be operated by one man for an entire shift. Its speed and accuracy increase holes per man-hour . . . affords cleaner, completely uniform holes. Punch and die maintenance and sharpening costs are considerably lower per hole than in mechanical punch or twist drill methods. And CP Hydraulic Punches are ideal when teamed up with CP Portable and Stationary Cold Riveters.

Chicago Pneumatic *8 East 44th Street, New York 17, N.Y*

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

For more data circle **423** on Reader Service Card

THE *CORRECT* BLANCHARD WHEEL

GETS YOUR NOSE OFF THE GRINDSTONE

... WITH ***BEST SURFACE GRINDING RESULTS!***



BLANCHARD SURFACE GRINDERS give you peak production and economy when maintenance is performed on schedule, and when you use the best wheel for each job.

For more than 25 years, Blanchard has been making wheels that do their jobs in less time, with less trouble and cost . . . whether the work is tough as copper or fragile as glass . . . whether it requires heavy roughing cuts or clean-up cuts with flatness of .000005" to .000010" and finish of 1 to 3 micro-inches.

Our quarter century of experience has proven that Blanchard grinders perform best with Blanchard wheels...on every job!

SEND

FOR OUR *NEW, FREE FOLDER*

on Blanchard cylinder, sectored and segment wheels — in silicate, resinoid and vitrified bonds.

PUT IT ON THE

BLANCHARD

THE BLANCHARD MACHINE CO.

64 STATE STREET • CAMBRIDGE 39, MASS., U. S. A.

Gentlemen:

☐ Please send new *Blanchard Wheel and Segment folder.*

☐ Please send *The Art of Blanchard Surface Grinding.*

NAME_____

TITLE_____

FIRM_____

STREET_____

CITY_____ ZONE_____ STATE_____

For more data circle **424** on Reader Service Card

new shop equipment

new shop equipment

Descriptions of new machine, tools and materials for the metalworking industry

DRUM-TYPE MACHINE DRILLS AT RATE OF 12 INCHES PER MINUTE

Barnes Drill Co., 860 Chestnut St., Rockford, Ill., has announced a special nine-station drum-type high-production machine for drilling, tapping and chamfering a complete range of pump bodies for fuel pumps. Different pump models are interchanged on the machine by substituting the proper auxiliary head for different bolt circles. Heads are cluster style which facilitate changeover. In addition to its flexibility, the machine, it is claimed, is unusual because it has cluster-style heads designed to operate high speed cutting tools at maximum speeds. The machine is said to be capable of drilling at the rate of 12 inches per minute.

Composed of right and left stations, the machine cycles completely in 21 seconds, drilling, tapping and chamfering 57 different holes in 14 different sizes ranging from 0.062 to 1⅜ inches in diameter, 20 to 32 threads per inch. Of basic BarnesdriL unit-type construction, the machine consists of one 30-h.p. unit with 38-spindle head, two 1½-h.p. units with one single and one 2-spindle heads, two drilling units, one single spindle lead screw tapping unit and one 15-spindle lead screw tapping unit.

For more data circle **72** on Reader Service Card

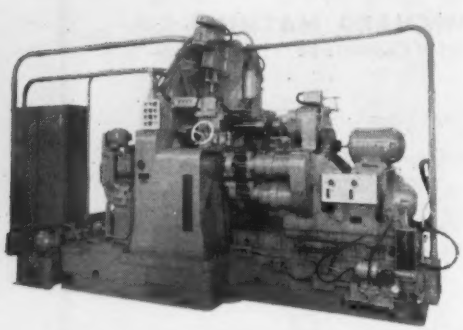


Illustration showing BarnesdriL Drum-Type Drilling, Tapping and Chamfering Machine

★ ★ ★

CONTOUR MILLING MACHINE IS AVAILABLE IN TWO MODELS

The Bridgwater Machine Tool Co., Akron, Ohio, has announced a contour milling machine which combines 360-degree trace with angular twist of the spindle. The machine is available in two models; namely, the Model R310, having a rectangular shaped work table available in lengths up to 20 feet, and the Model CD72, with a circular work table 72 inches in diameter. As suggested by the shapes of the respec-

tive work tables, the R310 is used mainly for work of generally rectangular shape and the CD72 for work of circular nature. According to the manufacturer, tracing motions of the machine make use of a specially-designed system of hydraulic control. The guiding brain of this system is a tape cam made of "Mylar," an unusually stable plastic material. Fabricated into an endless belt, this cam, having the template form of the piece to be milled, guides the stylus which actuates the hydraulic trace valves. This method, it is claimed, eliminates the need for a separate template table and makes it possible for an operator to control all cutting motions from his station near the workhead and spindle.

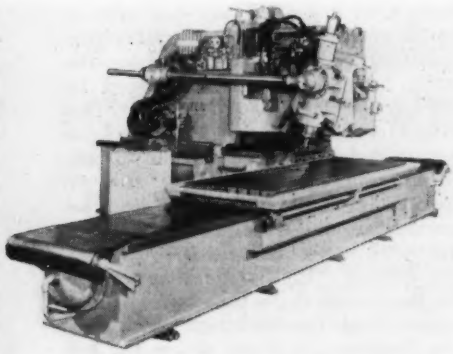
Cutting the template form into the cam belts is done by the machine itself, thus eliminating considerable time in both setup and repeat operations. Another time consuming job in all tracing operations, that of coordinating cutter and model, is said to be eliminated by the tape cam system. A master perforation on the tape engages a master tooth on the geared rollers which drive the belt and assures perfect automatic coordination of cutter and trace stylus. The milling machine emloys geared drive spindles with change-gearboxes to provide speeds from 100 to 3,000 r.p.m. Quickly interchangeable motorized spindles provide for horsepower and speed ranges as needed for contour milling of both steels and non-ferrous metals.

For more data circle **73** on Reader Service Card

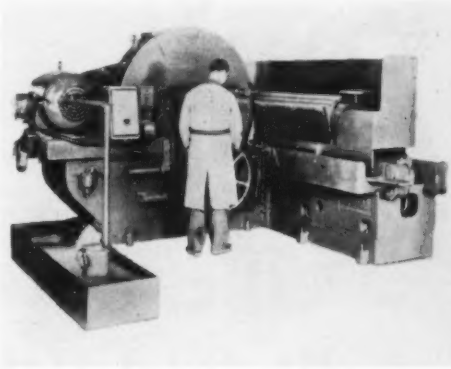
★ ★ ★

MACHINE ACCURATELY GRINDS SHEAR BLADES, KNIVES AND FLAT SURFACES

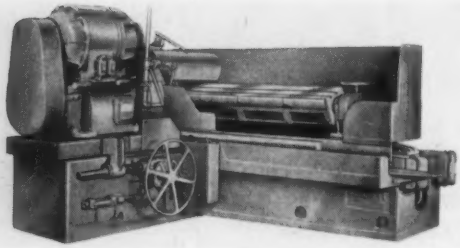
Designated as the "Big 60 Hogger" and the "Hy-Power," two heavy duty machines which are designed for the accurate grinding of shear blades, knives and flat surfaces at an unusually high rate of production have been announced by Hanchett Mfg. Co., Big Rapids, Mich. Capacities of both machines range from 60 to 296-inch workpiece length. Grinding wheel spindles 5 and 6½ inches in diameter are mounted with extra heavy-duty precision taper roller bearings set in massive cast iron housings. Motors for driving the segmental-type grinding wheels range from 30 to 75 h.p., dependent upon workpiece capacity and produc-



Bridgwater Model R310 Contour Milling Machine with rectangular type work table



Hanchett "Big 60 Hogger" Heavy-Duty High Production Shear Blade and Knife Grinder



Hanchett "Hy-Power" Heavy-Duty High Production Shear Blade and Face Grinder

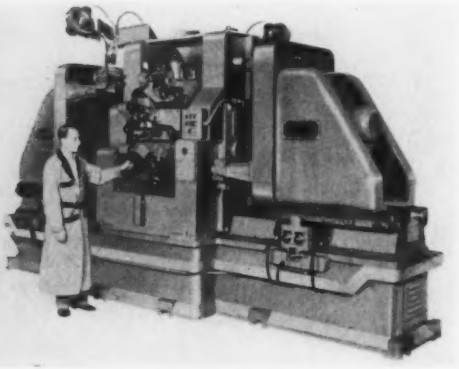
tion requirements. Table drives are hydraulic with dual cylinders and specially designed mounting features to eliminate all piston sag so that smoothness of operation of the work table is assured. Standard table speeds are from 10 to 120 f.p.m. Faster table speeds can be furnished when required.

The "Big 60 Hogger" utilizes a grinding wheel 60 inches in diameter of periphery segmental type mounting that is made up of 40 large abrasive segments alternately mounted. The machine is said to eliminate burn, heating or checking of the workpieces. The "Hy-Power" has unusually wide ways. The V-ways are 5 inches wide, and the flat ways are 3 inches wide. Large heavy-duty square revolving knife bars are furnished as standard equipment with a choice of 10 or 12-inch work faces available. This machine is equipped with either 30 or 36-inch diameter heavy-duty segmental grinding wheel chucks mounted to an extra large diameter heavy-duty wheel supporting flange.

Both machines have a belt cover to fully protect the machine ways from dirt, vapor and grit. The cross feed mechanism utilizes dual in-feed controls, both manual and automatic. Automatic in-feed is by a hydraulically-driven cam-actuated device with graduated dial and can be adjusted from 0.00025 to 0.006 inch per table stroke. Coolant systems are motor driven and have large capacities.

For more data circle **74** on Reader Service Card

★ ★ ★



Michigan Double-End Drilling and Assembly Machine equipped with automatic index table

DOUBLE-END DRILLING AND ASSEMBLY MACHINE HAS AUTOMATIC INDEX TABLE

Designed to provide unusual production in a limited working area, a double-end drilling and assembly machine with a trunnion-type automatic index table has been announced by Michigan Drill Head Co., P. O. Box 4643, Detroit 34, Mich. The index table is mounted in a vertical plane to conserve valuable floor space, and all operations, both production and assembly, are fully automatic. The machine drills two holes for the heat control butterfly in the manifold; reams the two holes; drills the stop pin hole; hopper feeds two bushings; presses the two bushings in place; stakes the two bushings; reams the bushings; hopper feeds the pin; presses the pin into place, all automatically. According to

SHELDON

CHICAGO U.S.A.



Sheldon's larger, wider "Zero Inspection", Tapered Roller Spindle Bearings save you money by making these lathes better in 6 ways.

Write for G-55 catalog showing new 10" 11" and 13" swing, bench, cabinet and pedestal mounted Sheldon Precision lathes.

1st They *meet* Sheldon's high standard for accuracy—each bearing has a run out limited to .00015"

2nd They absorb thrust and radial loads beyond requirements—basic rating on front bearing at 500 R.P.M.

for radial loads.....3540 lbs.
thrust loads.....2335 lbs.

3rd They *end* costly bearing maintenance—require only a fractional turn of bearing take-up after long periods of service.

4th They *hold* the spindle in rigid alignment while permitting it to turn freely at high or low speeds—the line contact between rolls and races, and the opposing taper design, preclude lateral movement or end play.

5th They *minimize* friction—smooth mirror finished rollers and races running in light oil, deliver more horsepower at the Spindle Nose and lower power costs.

6th They *increase* work capacity. Larger than similar type bearings on other lathes in this price range, these bearings make it possible to turn out *more work* and *better* work at lower costs.

SHELDON MACHINE CO., INC.

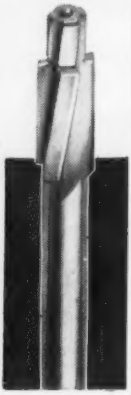
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For more data circle **425** on Reader Service Card

SUPERBORE
COUNTERBORES

in Standard sizes and Oversizes — above standard dimensions

- Finest High Speed Steel
- Smooth, Fast, Free-Cutting Operation
- No Clogging or Freezing of Chips



• Fore and Aft precision grinding of flutes and pilot allow chips to flow out freely. SPECIAL Pilot and Flute diameter's ground from blanks in three to four days.
• SUPERBORE counterbores in stock for immediate delivery.

write for BULLETIN No. 20

GARBERDING STOP PINS



in 5 sizes

• STOP-PINS are complete self contained units that hold securely in stripper plate. All sizes have 1/32" wall permitting insertion close to die or punch. NO THREADS inside STOPS for springs to catch on.

write for BULLETIN No. 25

in emergency phone: LIBERTYVILLE 2-4200

TWENTIETH CENTURY MANUFACTURING CO.
ROUTE 176 and BRADLEY ROAD
BOX 429 LIBERTYVILLE, ILL.

For more data circle 426 on Reader Service Card

the manufacturer, the machine produces 120 manifolds per hour with bushings and pin in place.

All units of the machine are hydraulically operated, and lubrication is automatic. Ways are hardened and ground. Vickers controls are used on the hydraulic pump and the control panel, and the machine features J.I.C. construction throughout. For the changing of parts or models, the center section is easily accessible for conversion or retooling.

For more data circle **75** on Reader Service Card

★ ★ ★

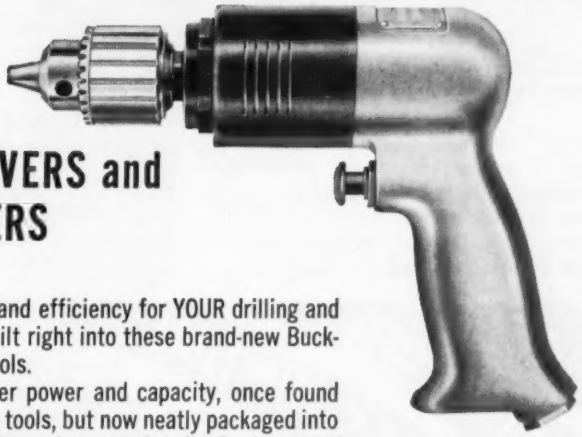
DUPLEX MILLING MACHINE HAS HEAVY-DUTY, TRAVELING MILLING HEADS

The Motch & Merryweather Machinery Co., 1250 E. 222nd St., Cleveland 17, Ohio, has designed and built a duplex milling machine which features heavy-duty, traveling milling heads for handling large, awkward parts. The machine illustrated herewith mills both ends of tractor frames. Two floor-mounted, load-unload benches and duplicate sets of work-holding fixtures are provided. At one end of the machine bed, a traveling milling head is mounted on fixed ways. Opposed to the fixed ways, at the opposite end of the bed, is a saddle. The saddle is mounted on ways to provide adjustment of from 6 inches to 11 feet for the length of the piece being milled. Ways on the saddle provide for mounting the second traveling milling head.

The tractor frame is located and securely clamped in individual fixtures for each end of the part. The tractor frame itself is sufficiently rigid to provide for joining these two fixtures into one solid, component unit. The clamp-

Keep your eye on Buckeye

AND THIS COMPLETELY *NEW* SERIES OF



DRILLS, SCREWDRIVERS and NUTRUNNERS

Here's NEW speed and efficiency for YOUR drilling and fastening work—built right into these brand-new Buckeye B Series air tools.

Here's the greater power and capacity, once found only in bulky, heavy tools, but now neatly packaged into compact, lightweight and easy-to-handle Buckeye tools.

Here, too, are the latest advancements in air tool design, like the Buckeye Package Valve, quickly and easily removed—in a single unit—for inspection and servicing. If maintenance is indicated, just slip another valve unit in place and keep the tool on the line! And the fully controllable exhaust deflector that can be positioned anywhere in a full 360° circle to satisfy any tool operator. And the smooth, palm-fit handle, free from objectionable angles and projections, positioned for perfect tool balance.

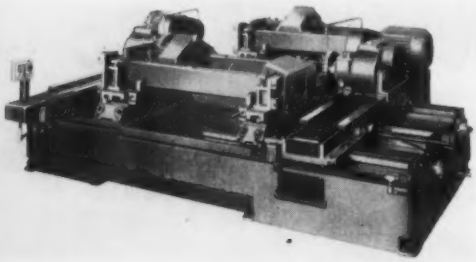
These and other features that will mean greater productivity on your work are fully described in our new Catalog G-10; your copy is ready now!

Buckeye Tools
CORPORATION
DIVISION 17 • DAYTON 1, OHIO

producers of the world's first successful rotary air tools

For more data circle **427** on Reader Service Card

new shop equipment . . .



Motch & Merryweather Duplex Milling Machine for machining tractor frames

ing and locating of the frame in the fixtures is accomplished on a loading bench separate from the machine. The frame and fixtures are then placed on the machine, located by keys and secured by quick-acting clamps.

Duplicate fixtures make possible loading and unloading one fixture while milling simultaneously on the other. The right and left-hand milling units are the Motch & Merryweather standard, heavy-duty Model M-30. The milling heads are individually motor driven by 30-h.p., 1,800 r.p.m. motors. Nonmetallic way liners are used, as well as hardened and ground steel ways and automatic pressure lubrication. Heads are hydraulically operated by dual pumps from a single floor-type sump.

For more data circle **76** on Reader Service Card

★ ★ ★

FOLDER BRAKES ARE AVAILABLE IN THREE MODELS

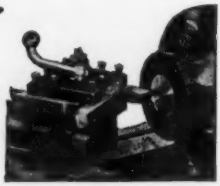
Dreis & Krump Mfg. Co., 7418 S. Loomis Blvd., Chicago 36, Ill., has announced three "Chicago" Folder Brakes which are available in a single-

Enco

TURRET TOOL POSTS

SAVE VALUABLE SETUP TIME

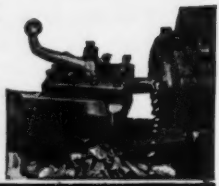
The three photos at right illustrate the flexibility of 12-position indexing, whereby each tool may be used in three different working positions.



¾" square tool bit mounted in Model 4½-S turret used for facing cut.



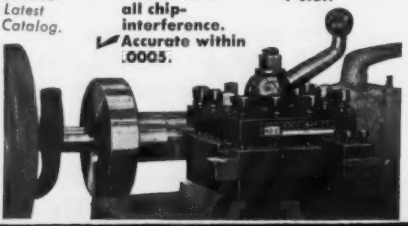
Same tool used for broadface turning merely by indexing turret one position or 30°.



Same tool used for inside chamfer merely by indexing back two positions or 60°.

- 12-position indexing.
- Hardened steel construction.
- Mounts rigidly in compound T-slot.
- Keeps setting accurately
- Indexing is self-contained —eliminates all chip-interference.
- Accurate within .0005.

Send for Latest Catalog.



Manufacturers of the most complete line of Hexturret Bed Turrets, Turret Tool Posts and Tail Stock Turrets in the Country. Send for latest Catalog.

ENCO Manufacturing Co., Dept. 145

4524 W. FULLERTON AVE., CHICAGO 39, ILL.

Reasonable Deliveries

For more data circle **428** on Reader Service Card

The All New DUSTSNAIRE

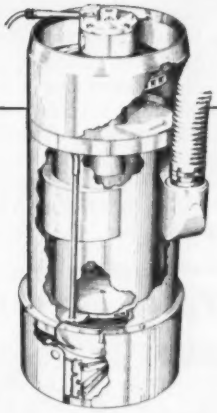
Compact — takes only 4 sq. ft. floor space — easily portable



100% efficient at all times — no efficiency drop

Guaranteed to remove all particles 3 microns or larger having a specific gravity of more than 1.5

for "STAR" DUST EXHAUSTER Performance

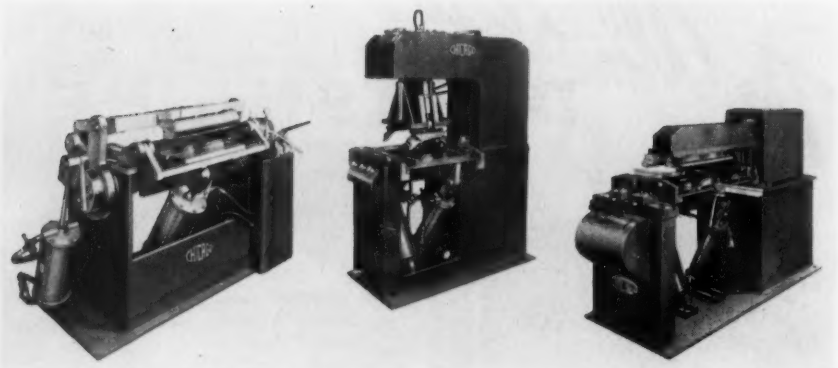


Easy to operate — no parts to wear — no bags to change or clean

Abrasive offers to all users of grinding machines for the first time the Feifel DUSTSNAIRE — the scientific answer to the grinding dust problem. May we send you details on this compact, dependable unit? Write for DUSTSNAIRE catalog. Abrasive Machine Tool Company, 20 Dunnellen Road, East Providence 14, Rhode Island.

ABRASIVE
ACCURACY BOOSTS PRODUCTION

For more data circle **429** on Reader Service Card



"Chicago" Folder Brakes: (left to right) single-wing model, double-wing model with open throat and fixed head, and double-wing model with open type throat and moving head

wing model, a double-wing model with open throat and fixed head and a double-wing model with open throat and moving head. The machines are custom built to meet the individual requirements for length of bend, distance between bends, sharp or radius bends with or without flanges, offsets or beads. Either model can be supplied as a single-purpose machine or may incorporate flexibility to handle a variety of sizes or products. Pneumatic, hydraulic or mechanical operation is offered to suit conditions. According to the manufacturer, the machines are ideal for tangent bending and folding on casings and other parts and feature a fully automatic operating cycle.

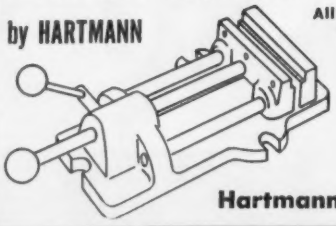
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★ ★ ★

DIAFORM PRESS IS AVAILABLE IN EITHER A 10,800 OR 19,500 TON CAPACITY

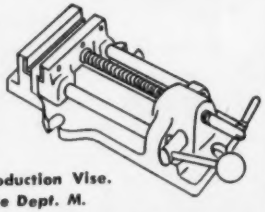
The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has announced a Diaform press, for the Guerin process, which is available in two models with

INSTANT ACTION by HARTMANN



RAPIDSET
All Purpose Tool Room And Machine Shop Vises.

The JAWSET
Adjustable Pressure Production Vise.
For Information Write Dept. M.



Hartmann Mfg. Co., 1637 Goold St., Racine, Wis.

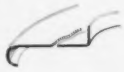
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ERCO SHEET METAL FORMER AND FLANGER...

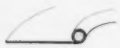
FLEXIBILITY that saves money...



1. ERCO forms External and Internal Flanges on irregular edges of flat sheet metal, circular discs or rings.



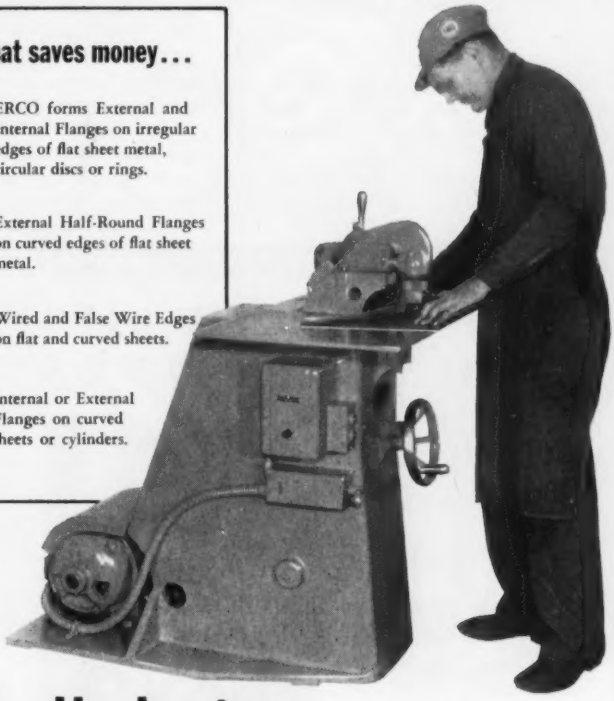
2. External Half-Round Flanges on curved edges of flat sheet metal.



3. Wired and False Wire Edges on flat and curved sheets.



4. Internal or External Flanges on curved sheets or cylinders.



ERCO eliminates costly hand operations...

No longer must difficult forming and flanging operations be limited to costly, time consuming hand production or to expensive power press and die equipment. In a fraction of the time required to do the job by hand, the ERCO MODEL "HD" can form Plain, Return Bend, Flared, Large and Small Bend Radii, Half Round Flanges, and Wired or False Wire Edges on irregular curved and straight edges of sheet metal . . . also Outside and Inside Flanges on circular discs and rings, and on curved sheets or cylinders. Edges produced by the ERCO are smooth and well-formed. The ERCO will handle Soft, Semi-Hard or Stainless Steel, Soft or Semi-Soft Brass, Copper, Soft or Heat-Treated Aluminum Alloys and Monel Metal.

For complete information, send for illustrated Bulletin 158 today!

ENGINEERING and RESEARCH

A DIVISION OF acf INDUSTRIES INCORPORATED

RIVERDALE, MARYLAND

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capacities of 10,800 and 19,500 tons, respectively. The principle of operation of the press is said to be simple. It consists of a barrel-like steel container in which there is a rubber diaphram and a rubber pad. The diaphram is positioned over the rubber pad. When hydraulic fluid is pumped into the diaphram, pressure is exerted on the pliable rubber pad and forces it down over the form blocks. After forming, the oil is pumped from the diaphram and the sliding table containing the formed parts is removed from the press.

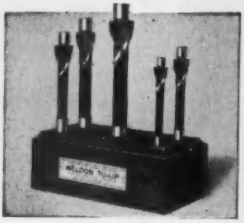
The press features two reciprocating tables that operate alternately from each side of the pressure housing. The tables are actuated laterally by a fluid motor drive through a dual chain conveyor to positive stops. At the proper position, the table stops and automatically raises so that the work is positioned directly under the rubber pad facing. The table, in this position, is rigidly supported and locked in position by filler plates that are actuated by a double-acting hydraulic cylinder. All motions are hydraulically cushioned to prevent the misplacement of work on the table. After work is completed, the table automatically lowers and retracts to the extreme position outside the press, and the other table can automatically follow into the pressing position.

The entire table top of the Diaform

YESTERDAY'S PIONEER . . . TODAY'S LEADER

WELDON "TU-LIP" COUNTERBORES

For FAST, FREE CUTTING





As the name implies, WELDON "Tu-Lip" counterbores have only two cutting lips or flutes. This feature, together with the fast spiral, makes the "Tu-Lip" the fastest, freest cutting counterbore on the market.

Breakage due to clogging is prevented because this improved cutting tool provides more than ample chip room. Furnished singly in sizes desired or in convenient wood block sets as illustrated.

Weldon distributors throughout U. S. A. and Canada carry complete stocks to serve you.

WRITE FOR LATEST CATALOG NO. 10.

THE WELDON TOOL CO. Cleveland 4, Ohio

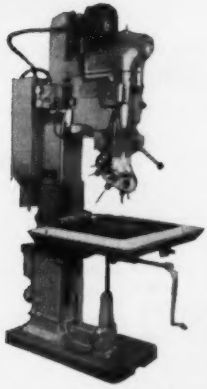
3000 WOODHILL ROAD

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different DRILL or TAP operations on one press



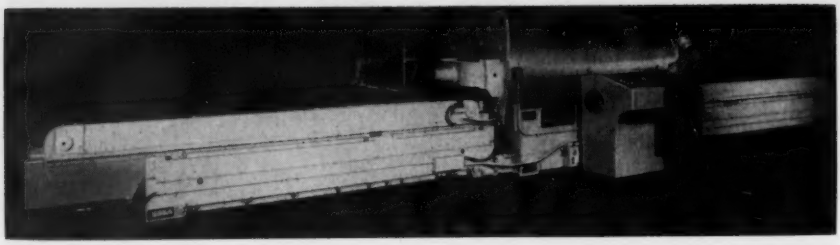
The H & F Turret Drilling Machine— pre-set depths, speeds and reversals, accuracy . . . economy . . . less space

hf

HOWE & FANT

Send for H. & F. Bulletin
HOWE & FANT INC., 29 Fitch St., East Norwalk, Conn.

For more data circle **433** on Reader Service Card



H-P-M Diaform Press, which is available in either a 10,800 or 19,500-ton capacity

press may be used as it is flat and is raised into the pressure retainer during the forming cycle. This means that if heavy forms are used, they may be easily rolled directly onto the table surface. It also means that the operator has immediate access to any part of the table and work at a level convenient for hand work. There are said to be no restrictions on the placement of forming blocks, if they are of different heights, other than the consideration for the amount of deformation of the pad in that area. According to the manufacturer, there is no possibility of sticking the table in the pressure hous-

★ ★ ★ ★ ★

A high-precision lathe that meets every standard for quality & performance

Metronic LATHE

SHORT CUT TO ECONOMY!

only $289



Price Incl. Motor, V Belts & Pulley. F.O.B. Newark

Distributor Inquiries Invited.

A master-designed machine that professionals and small-parts mfrs., amateurs, demand—AT A PRICE HERETOFORE UNATTAINABLE. Thoroughly seasoned, one-piece cast iron construction, complete interchangeable headstock, tailstock, and bed . . . extremely close tolerances possible, with indicator readings to plus or minus .0001 . . . 5/16 collet capacity, 2 point suspension, 4" swing and many other features. Complete with all standard equipment, on a noise and vibration-proof mounting. Accessories and Hardwood Base available.

Schultz & Anderson Co.

113 Edison Place, Newark 5, N. J.

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Powered by the press ram... independent of the die

2 SIZES Cuts steel up to 1/16" thick

3" WIDE $69 **6" WIDE $95**

Guaranteed — money back if not 100% satisfied

New LOW prices on the JACO AUTOMATIC STOCK REEL



WRITE FOR FULL DETAILS TODAY!

Dealer Inquiries Invited

JACO DEVICES, INC.

98 High Street
HINGHAM, MASS.

For more data circle **435** on Reader Service Card

Faster ANGULAR SET-UPS WITH GAUGE BLOCK ACCURACY

MAGNA-SINE

ON angular set-ups the Magna-Sine saves hours of set-up time, provides positive accuracy, holds work securely without distortion.

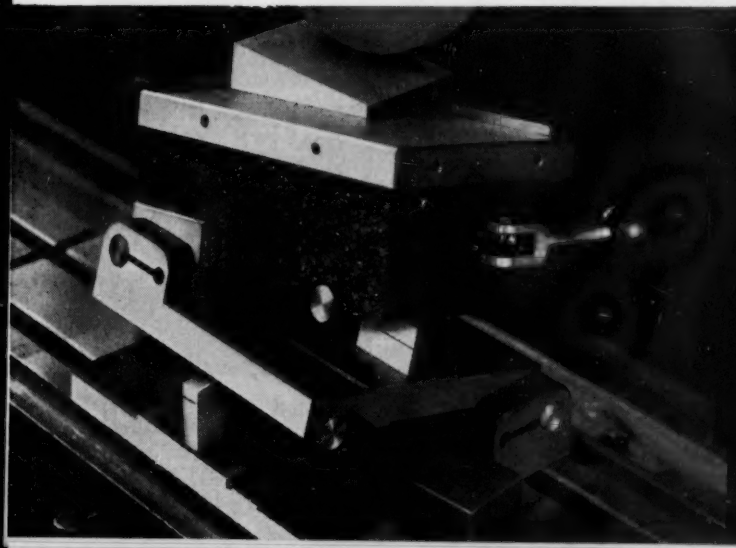
The Magna-Sine is a quality permanent-magnet chuck mounted on precision hardened and lapped hinged plates. A Table of Constants provided, quickly shows the standard gauge blocks to insert between the plates for any angle—single or compound. Set-ups to gauge block accuracy take minutes, not hours! When closed, the Magna-Sine is used as a conventional magnetic chuck. Thousands are in daily use.

Write for your free copy of the Magna-Sine Catalog which shows all styles and sizes . . . price list is included.

OMER E. *Robbins* COMPANY

DEPT. B-1, 24800 PLYMOUTH RD. • DETROIT 28, MICH.

Also producers of special gauges and fixtures

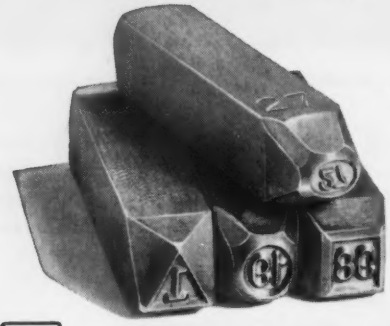


for

GRINDING
INSPECTION
DRILLING
BORING

AT ANY ANGLE

INSPECTORS' and CODE SYMBOL STEEL STAMPS...



98 5/16" 98 1/4" 98 3/16" 98 5/32"

ACTUAL SIZE OF IMPRESSION

. . . for quality control IN YOUR PLANT . . . *quick identification of inspector, company or part supplier, machine operator, shift, operation, etc.*

. . . for the mark of controlled quality on your product. *YOUR CUSTOMERS recognize your inspection mark as a symbol of insured dependability.*

Identification numbers from (1) to (99), inside standard 5/32, 3/16, 1/4 and 5/16 inch borders. Special sizes and symbols on request.

Write for complete Catalog NM-51.

NEW METHOD STEEL STAMPS, INC.

147 Jos. Campau · Detroit 7

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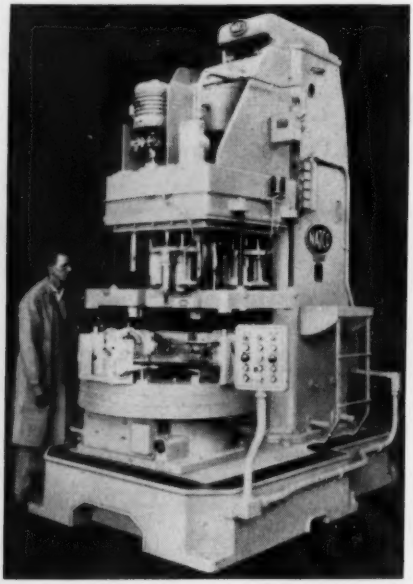
ing through misplacement of form blocks or throw pads. The table may be lowered and removed to the outside where it is easy to work upon.

For more data circle **78** on Reader Service Card

★ ★ ★

HEAVY-DUTY VERTICAL COMBINATION DRILLING AND TAPPING MACHINE

National Automatic Tool Co., Inc., Richmond, Ind., has announced the Natco D4A Heavy-Duty Vertical Holesteel Combination Drilling and Tapping Machine which is said to be capable of drilling, reaming, spot-facing and tapping 27 transmission rear bearing retainers per hour at 85 per cent



Natco D4A Heavy-Duty Vertical Holesteel Combination Drilling and Tapping Machine

Talking About Die Sets



WITH

PHIL MARSILIUS

Vice-President
The Producto Machine Co.

9 Ways to Save on Special Steel Die Sets—Here are some suggestions that can save you money on machine work and shorten delivery time when you order special steel die sets: 1. Specify flame-cut edges, rather than machined edges, where possible. 2. Where close limits are not important, flame-cut clearance holes or cut-outs should be specified. Unnecessary machining increases cost. 3. For cut-outs requiring more accuracy than flame-cutting but less than machining, specify "saw-cut" to keep costs down. 4. On all types of cut-outs, keep radii in corners as large as possible.

5. Try to keep hole location tolerances as liberal as possible to reduce machining time. 6. On pin supports or bushing supports, welded construction is less expensive than dowelled and bolted construction. 7. On hold-down pads or flanges, the clamping slots should be flame-cut. 8. Bolt slots machined in pads should have one radius on the inside instead of two small radii corners. 9. Avoid special pins or bushings wherever possible.

★ ★ ★

A New Look in Die Sets—In case you haven't noticed, there's a new look in die sets. The new design offers these improvements: much more layout and mounting area on punch holders and die holders; maximum strength;



assurance of uniformly accurate location of pin and bushing holes. In addition, we felt that clean lines designed into a set would show the tooling to better advantage and make the completed unit look more like the precision instrument it really is. So you see, a die set can now make your work easier and your product better looking.

★ ★ ★

Proper Lubrication of Die-Set Pins and bushings helps to prevent seizing and galling, adds substantially to the life of your die sets. A new flexible reservoir type lubricator has been developed for this purpose. The guide bushings dip into the reservoir with each down stroke of the press, coating the entire pin with lubricant on the return stroke. It's an inexpensive way to get thorough lubrication for long periods of time without need of constant attention. Other lubrication methods will be discussed at a later date.



One of many major foundry improvements at Producto is this new continuous-pour operation which also provides continuous slag removal. The 12,000-lb. die set shown below is an example of the top-quality sets obtainable through Producto's "under-one-roof" service—pattern, casting and machining.

WHERE A BETTER DIE SET STARTS

Producto's newly-modernized foundry enables you to get higher-quality die sets...faster.



So extensive have been foundry improvements at Producto that little of the equipment or methods of two years ago remains. A new and larger cupola, stack, slag disposal unit, continuous-pour ladle, abrasive cleaning machine, sand conditioner, and conveyor systems for sand and molds have been installed.

FOR YOUR DIE SET REQUIREMENTS, THIS MEANS YOU GET:

HIGHER QUALITY sets, since Producto can produce a laboratory-controlled iron and steel mixture free of hard spots and blow holes.

FASTER SERVICE on catalog semi-steel sets, because combination of internal foundry and machine shop makes possible a full inventory at all times. Time from order to shipment never exceeds three days.

FASTER SERVICE on special semi-steel sets. A modern pattern shop in the plant expedites making patterns for your specials. No dependency on outside suppliers.

The improved foundry is but one of the reasons more and more die set users are specifying Producto. For precision die sets fast, call your nearest Producto branch.

THE PRODUCTO MACHINE COMPANY
910 Housatonic Avenue, Bridgeport 1, Connecticut

For prompt die set service, 'phone these PRODUCTO assembly warehouses:

Atlanta	CY 7667	Detroit	LI 6-7600	New York	WO 4-7484
Chicago	ES 8-3307	Kansas City	VI 1162	Philadelphia	MO 4-1010
Cleveland	SU 1-6158	Los Angeles	TR 9826	Rochester	GL 1810
Dayton	MU 1651				

or check the Yellow Pages in any stamping center in the United States or Canada for distributors stocking PRODUCTO.

Produce More With PRODUCTO ***Die Sets***

For more data circle **438** on Reader Service Card

efficiency. The machine is provided with a four-position fixture, mounted on an eight-position indexing table, and is arranged to accommodate two parts in different locations in each position while performing the following operations: Position 1, remove and load two parts; Position 2, (Location A) drill one hole, (Location B) idle; Position 3, (Location A) ream one hole, (Location B) idle; Position 4, (Location A) drill one hole, (Location B) idle; Position 5, (Location A) combination spot-face two holes, (Location B) combination drill and countersink two holes; Position 6, (Location A) combination finish and spot-face two holes, (Location B) tap two holes; Position 7, (Location A) combination align and ream two holes, (Location B) idle; Position 8, (Location A) tap one hole, (Location B) idle.

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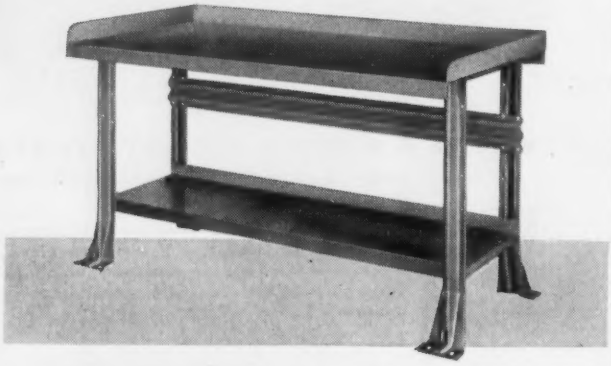
MICRO DRILLS

Precision-made micro drills in flat or spiral twist, made of high speed steel with a micro size range of from 0.0059 (0.15 mm.) to 0.0394 (1.000 mm.) inch have been announced by Chicago-Lat-



Chicago-Latrobe Precision Micro Drill

save with standard



HALLOWELL® WORK BENCHES

HALLOWELL FEATURES

Sturdy, rigid, durable

4 tops—steel, Presdwood on steel, laminated wood, ShopTop

4 lengths, 5 widths, 3 heights—all standard

Use them as single units or continuous benches of any length

Neat, functional design

Standard units with *standard* accessories permit you to *custom build* HALLOWELL Work Benches to fit your requirements. Stocked by leading shop equipment dealers. Write for literature. STANDARD PRESSED STEEL CO., Jenkintown 22, Pa.

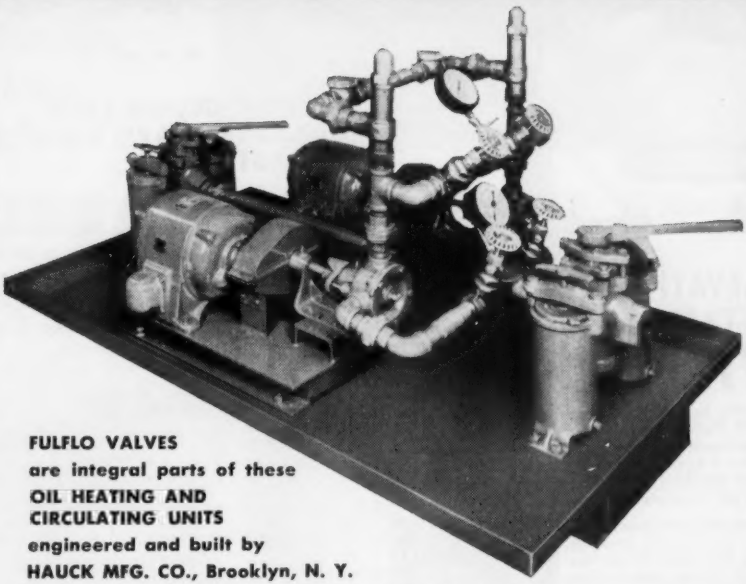
HALLOWELL SHOP EQUIPMENT DIVISION SPS JENKINTOWN PENNSYLVANIA

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OIL PRESSURE RELIEF VALVES

INSURE CONSTANT, UNIFORM, PRESSURE



FULFLO VALVES
are integral parts of these
OIL HEATING AND CIRCULATING UNITS
engineered and built by
HAUCK MFG. CO., Brooklyn, N. Y.
Manufacturers of Oil and Gas Burners and Equipment

These valves are installed in a jiffy . . . and stay put! Desired pressure is determined by 5 springs. . . . NO MAINTENANCE REQUIRED. From 0# to 500#. Standard and flange models, pipe sizes: ¼" to 2".

Write on your letterhead for personal copy of

FULFLO MECHANICAL DATA BOOK



TRADE MARK "FULFLO" REG. U.S. PAT. OFF.

THE FULFLO SPECIALTIES CO. Inc.
PUMP AND VALVE MANUFACTURERS
BLANCHESTER, OHIO

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WHICH DO YOU DO?

LOADING & UNLOADING

SHEET FEEDING

WORK POSITIONING

DIE HANDLING



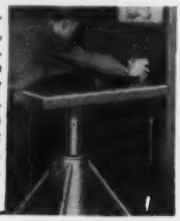
RAYMOND

PORTABLE

ELEVATING TABLE

FITS ALL FOUR!

No table has so many practical uses as this RAYMOND Portable Hydraulic Elevating Table! Use it for positioning or handling throughout the plant . . . see how it lightens your work load. RAYMOND Hydraulic Elevating Table has sturdy 30" square top which can be rotated when desired.



Convenient foot pump simplifies raising and lowering, leaves operator's hands free. Smooth-rolling casters make table highly portable. Floor lock holds it securely in place. Standard Model elevates from 28" to 44"; Telescopic Model from 28" to 50". Both models have 2,000 lb. capacity.

The RAYMOND CORPORATION

8837 Madison St., Greene, N.Y.

Please send me Bulletin 233 on your Portable Elevating Table.

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ STATE _____

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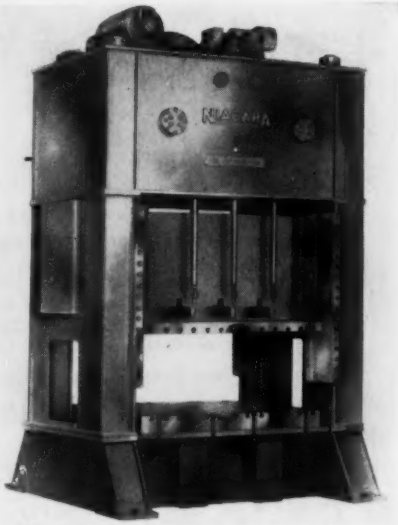
robe, 419 W. Ontario St., Chicago 10, Ill. The high quality drills have bright flutes and are accurately ground. According to the manufacturer, the drills are ideal for drilling fuel jets, watch and carburetor parts and other instruments where accuracy is required in drilling very small holes.

For more data circle **80** on Reader Service Card

★ ★ ★

ECCENTRIC GEARED PRESS FOR LARGE, HEAVY TONNAGE WORK

Designed to handle a tremendous variety of large, heavy tonnage drawing, punching and blanking work, a straight side eccentric geared press, designated as the Series SE, has been engineered by Niagara Machine & Tool Works,



Niagara Series SE Straight Side Eccentric Geared Type Press for heavy tonnage work

Hanchett Magna-Lock Magnetic Chuck at Turchan Follower Machine Co.



REDUCES SETUP TIME 66.6%

THE JOB: Milling hard cast iron gibs, 1⅜" maximum width, variable lengths, 60° compound angle, .250" taper per foot. Roughing cut: 1⅜" max. width, 0.200" depth. Finishing cut: 1⅜" max. width, 0.050" depth. Spindle speed: 385 RPM. Cutter: 8-flute carbide tip 3" dia. Table speed: 15 IPM—20 IPM. Stock removal: Approximately 4 cu. in. per min. Fixture: mechanical.

THE PROBLEM:

1. Fixture setup time and handling was 60 minutes plus time required to layout, drill and tap holes in the gibs to coincide precisely with the bolts of the fixture. Spacing varied between 9" and 10" at several intermediate increments.

2. The holes were not functional parts of the gibs, being used only to hold the gibs while being milled.

3. Because of the several milling operations, the gib had to be removed each time and re-bolted to the fixture.

THE SOLUTION: A Hanchett MAGNA-LOCK Magnetic Rectangular CHUCK positioned on a sine bar, the milling machine cutter spindle being swiveled to the corresponding angles.

THE RESULT:

1. FIXTURE SETUP AND HANDLING TIME—20 MINUTES.

2. Layout, drilling and tapping operations eliminated.

3. Time required to re-bolt gibs on fixture for each operation eliminated.

You, too, can increase your machines' productivity with Hanchett Magna-Lock Magnetic Chucks and Devices. Take advantage of Magna-Lock's experience and engineering know-how—at your service to help solve your holding problems. Magna-Lock is the only *exclusive* manufacturer of magnetic chucks and devices.

WRITE TODAY, Dept. MM-45.

Request Magna-Lock as original equipment on your new machines.

Magna-Lock

Hanchett MAGNA-LOCK CORPORATION

Magnetic Chucks and Devices

BIG RAPIDS, MICHIGAN, U.S.A.

For more data circle **442** on Reader Service Card

683 Northland Ave., Buffalo 11, N. Y. Produced with one, two and four point suspension, covering a range of 100 through 1,000-ton capacities, the press is designed for work requiring large die areas; heavy tonnage demands; long stroke, deep drawing jobs where work is engaged high up on the stroke; and bottom-of-stroke blanking and punching.

A key feature of the line is the crankless eccentric drive which delivers maximum torque with minimum deflection. The eccentric is an integral part of the main gear (or gears) which rotates on a stationary pin rigidly supported in the crown, close to the point at which the pressure is exerted. Serving merely as a pivot, the pin carries no torsional load and relatively little bending load. To provide the utmost in accuracy and to insure long die life, the frame is of rugged, all-steel, four-piece, tie-rod construction of great strength and rigidity. The low-inertia, pneumatic friction clutch is designed so that most of the weight of the clutch continues to rotate with the flywheel. Only the drive shaft and driving plate start and stop with each cycle.

The entire driving assembly is neatly housed in the crown. There is no exposed, overhanging flywheel, clutch, brake, shaft nor motor in the rear of the press to obstruct crane service, block light, throw grease or consume space unnecessarily. The latest op-

Torit Unitized Dust Control means each machine has its own custom-tailored dust collector designed to work specifically for *that* machine. There is no guess work, or average suction. Furthermore, dust control is provided only when that machine is running . . . there is no waste of power such as you have with centralized control when only a few machines are operating. This means better dust control at lesser operating cost and less initial installation cost. Get the facts now on how Torit will work better to . . . "CLEAR THE AIR".

See our catalog in Sweet's Machine Tool File, or write:

TORIT MANUFACTURING CO.
296 WALNUT STREET • ST. PAUL 2, MINN.

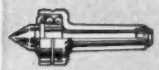
TORIT
UNITIZED
DUST
CONTROL

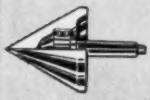
eliminates dust at its source!



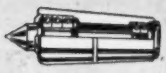
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Shank


Ball & Roller

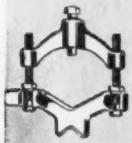

Pipe Type


Bull Nose


Built-in Spindle

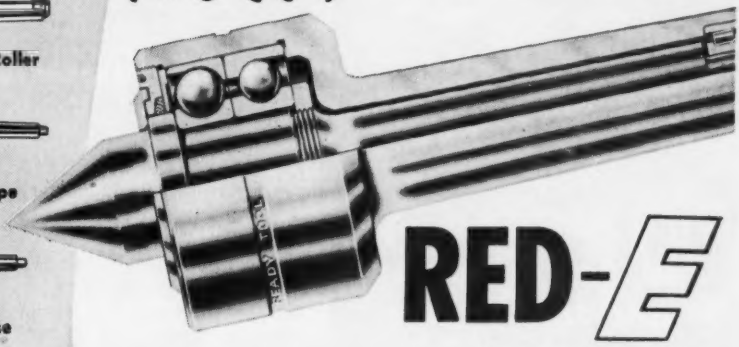

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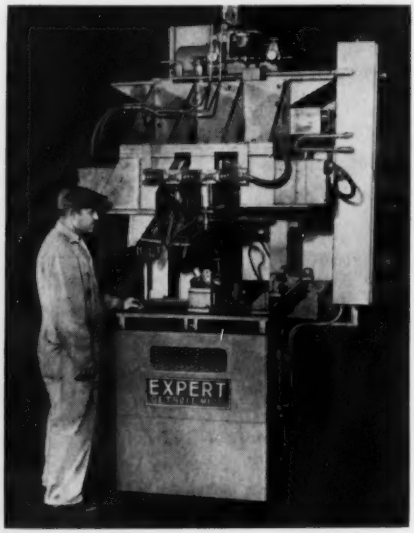
erating controls provide maximum protection for die setter, operator and the press itself.

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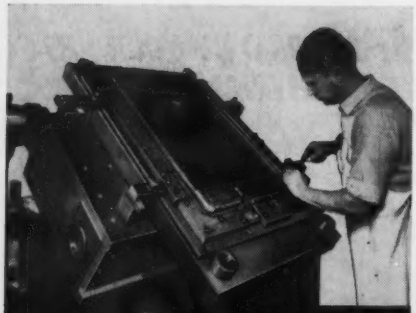
★ ★ ★

INVERTED MECHANICAL PRESS FOR RESISTANCE WELDING APPLICATIONS

A compact low-tonnage inverted mechanical press designed for a wide variety of spot and projection resistance welding operations is now available from Expert Welding Machine Division, 17144 Mt. Elliott Ave., Detroit 12, Mich. The machine is made in a line of standard 32, 42 and 60-inch models, each having adjustable strokes of 5, 6 and 8 inches. The press is rated at about 2 tons capacity. It has large up-

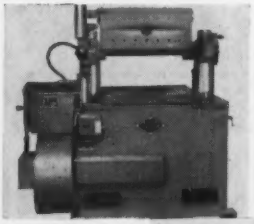


Expert Inverted Type Mechanical Press in use



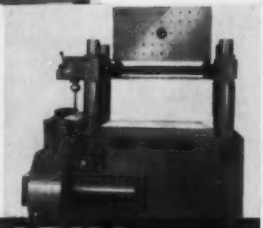
The ALPHA way shortens die tryout and finish time as much as 75%

Only with Alpha can you barber, shear, fit and finish both die members without removing dies from the press, thus permitting faster, more economical production.



(Left) 2 post press 50, 75, 100 tons.
(Below) 4 post press 100, 150, 200 tons.





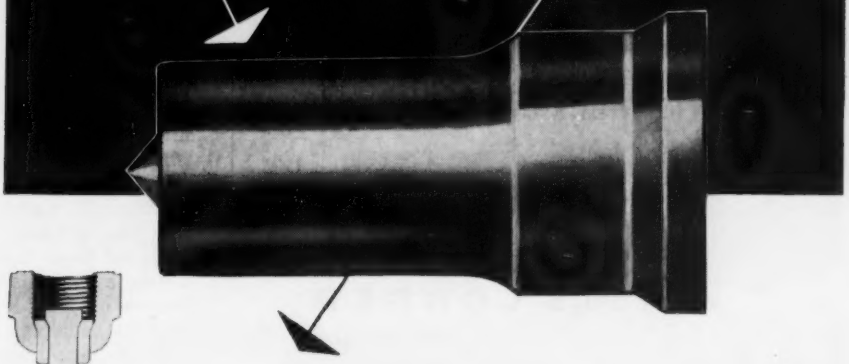
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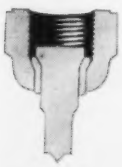
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9281 Freeland Ave., Detroit, 28, Mich.

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.... .. cut punch *Costs*

standardize on CLEVELANDS!







You both speed production and cut costs when you adapt your punching machines to use standard tools. With the Cleveland System of Standardization the *same* coupling nut and punch stem holds a wide range of punch sizes. As shown here, sleeves are used to adapt the smaller punches of any series to the coupling nut. For instance, by the use of but two sleeves, you punch holes ranging from ⅛″ to 1 1/16″ inclusive without changing nut or punch stem. This greatly reduces tool set-up time without reducing flexibility of operation.

Standard Cleveland punches cost less. There is no stock waste in production. Smaller sizes are made from smaller stock. They are made in quantity runs and shipped from inventory.

A-7266

THE CLEVELAND PUNCH & SHEAR WORKS CO. USA

Established 1880

PUNCHING TOOLS & DIES

FABRICATING TOOLS

POWER PRESSES

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per and lower platen areas which are said to extend the machine's application into other production operations. Maximum operating speed of the press is 2,200 strokes per hour. Both upper and lower platens have accurately spaced tapped holes which permit quick change-over from one electrode and fixture or die arrangement to another for small production operations.

The press features a simple, compact, self-contained mechanical drive unit called a mechanical knee. This unit is mounted in the base and raises and lowers the lower platen through a double scotch yoke mechanism driven by a 2-h.p. motor, clutch, brake and double-end worm gear speed reducer arrangement. The clutch and brake are combined in a specially adapted unit which stops the platen in the up or down position while the motor and flywheel run at constant speed. The mechanical knee unit can be easily removed from the C-frame by disconnecting one air and one electrical connection and removing a few bolts. It can thus be easily maintained, installed on other C-frames or reassembled to the frame to provide different shut height.

The lower platen unit is of welded construction and is guided by four guide bars that slide in bronze bushings in the laten structure. Two air cylinders, one on each side of the platen, are connected to a surge tank in a closed air circuit. These

When you want a "soft" hammer that's BETTER, SAFER COSTS LESS AND LASTS LONGER

That's when you want C/R Jawhead



They do more work with fewer blows! The secret—less rebound, longer striking contact. Faces won't slip, fly off, crack, or spark. Ideal for delicate parts, finishes. C/R Jawheads cost less. Buy C/R Jawhead from your local industrial supplier.

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in MILL HEADS

RUSNOK

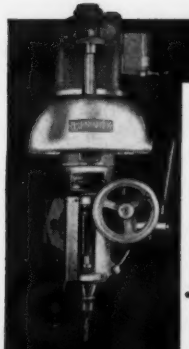
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Only low cost mill head with quill travel attachment.
High speed medium-light operation.
For bench, floor and pedestal mills.
Fits milling machines with overarm 1½" to 3".
⅜" end mill capacity.

$245.00



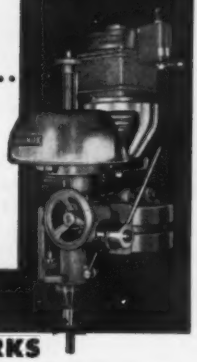
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HEAVY DUTY MILLING ATTACHMENT
Fits milling machines with 3" to 5" overarm.
¾" end mill capacity.
For vertical, horizontal and angular operations.

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HEAVY DUTY MILLING ATTACHMENT
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cylinders provide a pneumatic counterweight capable of balancing a 2,000-lb. load at 80 p.s.i. pressure. The only air consumed by this arrangement is that which may leak past the cylinders. The C-frame upon which the mechanical knee is mounted is of welded steel construction. The stroke of the press can be easily changed to each of the three settings by repositioning the cam followers to fixed locations in the scotch yoke mechanism.

For more data circle **82** on Reader Service Card

★ ★ ★

BATTERY-HYDRAULIC LIFT TRUCK

Designated as the Model WLFT 96 Worklifter, a battery-hydraulic lift truck which features a telescoping frame and which has a capacity for lifting 1,000 lb. has been announced by Economy Engineering Co., 4507 W. Lake St., Chicago 24, Ill. The overall height of the unit, at maximum fork lift, is 10 feet 4 inches. The base is equipped with two fixed wheels 5 inches in diameter and two swivel casters 8 inches



Economy Model WLFT 96 Worklifter with telescoping frame

900 pounds of magnetic grip at the click of a switch



Note how easily magnet supports weight of man seated at end of shaft.

Stearns drill stand magnet grips flat steel surfaces with 900 pounds of positive holding force — eliminates time-wasting mechanical clamps. Switch current on, you're ready to work — switch it off, you're ready to move. With this magnet holding the stand you can drill, ream, tap, saw holes, run nuts, etc., from any position — horizontally, vertically, upside down at various angles.

This unit provides full visibility of work; quick, accurate line-up; safe, secure holding. Magnet is 8½ inches in diameter, weighs only 54 lb.

Four Models of Lifting-Holding Magnets

Stearns also builds highly portable magnets for lifting steel blocks or slabs from floor to machine tools . . . holding sheets together for tack welding — a wide variety of lifting or holding jobs. Eliminates slings, hooks, clamps. Continuous or intermittent duty, 7-in. to 15-in. diameter. Write for bulletin 135-D. 1120

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS MAGNETS

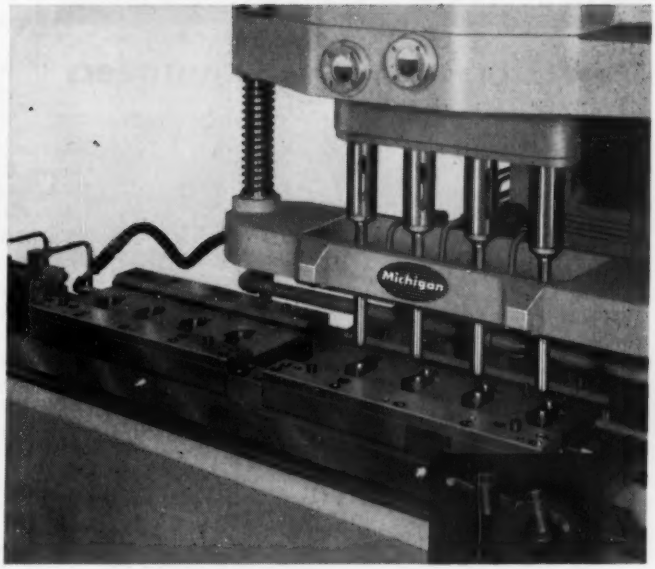
STEARNS MAGNETIC, INC., 664 S. 28th St., Milwaukee 46, Wis.

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Finish reams 1200 rocker arms per hour

Most Important

NO FURTHER SUPER FINISHING OF THE ROCKER ARM SHAFT HOLE IS NECESSARY



It's a 2-station Automatic Shuttle Fixture mounted on our Standard Hydro 5 Drill Press. Interchangeable nesting plates, for any size or shape rocker arm, will fit this machine.

Michigan

We also invite your inquiries as to our line of tapping units, and index tables—both manual and automatic—catalog sent on request.

DRILL HEAD CO. Detroit 34, Michigan

engineers and manufacturers of production machines and drilling equipment

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in diameter. The wheels are made of solid hard rubber with roller bearings. A foot-operated floor lock is mounted on the baseframe between the swivel casters.

The two button control station which has "up" and "down" push-buttons is mounted on a 12-foot cord, conveniently held by take-up cable reel for operation from the spot most convenient to the operator.

For more data circle **83** on Reader Service Card

★ ★ ★

CHUCK HOLDS MILLING CUTTERS WITH CYLINDRICAL SHANKS

J & S Tool Co., 645 W. Mt. Pleasant Ave., Livingston, N. J., is now manufacturing the Jahrl Milling Chuck which is designed to hold milling cutters with cylindrical shanks in modern machine tools so that they do not slip or draw out of the chuck. Identified as the J & S JAL, the chuck utilizes a clamping nut provided with a ball bearings to minimize friction when tightening the chuck. The inner taper of the

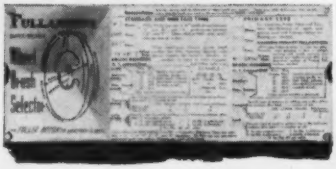


J & S Model JAL Milling Chuck in use

a FULLER BRUSH product

New Time-Saver for Engineers

YOURS FREE



Handy Fuller Slide Chart of Wheel Brush Specifications

Wheel brush selection with a flip of the wrist. No catalog searching . . . no comeback from "Purchasing" . . . You can even give them the stock numbers of:



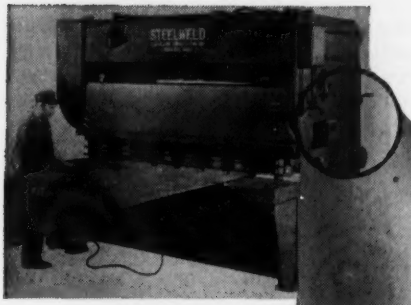
FULLANCHOR
Super-Balance
WHEEL BRUSHES

Yours for the asking, without cost or obligation, simply by writing to . . .

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3665 Main Street, Hartford 15, Conn.

a FULLER BRUSH product

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THE *Right* KNIFE CLEARANCE FOR EVERY PLATE THICKNESS

ONLY STEELWELD SHEARS HAVE THIS SIMPLE KNIFE ADJUSTMENT

It is simple, fast and easy to adjust the knife clearance on a Steelweld Pivoted-Blade Shear to suit every plate thickness. No bolts to loosen! No bed to move! No feeler gauges required!

Only turn a crank and watch a dial. That's all there is to it. The large easily-read dial indicates the clearance between knives in thousandths of an inch and also shows the plate thickness that may be cut with any knife setting. Because of the ease with which knife adjustments are made, every cut made on Steelweld Shears is the best cut possible—straight, smooth, accurate. And of importance, knives remain sharper for longer periods.

Steelweld Shears are built for thicknesses of 12 gauge to 1¼ inch and for lengths of 6 to 18 feet.





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CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

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STEELWELD PIVOTED BLADE SHEARS

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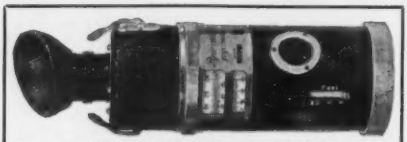
nose does not rotate against the matching taper of the collet, thus avoiding loss of constrictive power. According to the manufacturer, the collet is not submitted to any radial force while the chuck is being tightened, as the collet moves only axially on a cylindrical guide, allowing the cutter to be clamped in true center. To further increase the clamping power of the chuck, the collet is made with a locking taper which is released automatically when the clamping nut is turned counterclockwise one revolution.

For more data circle **84** on Reader Service Card

★ ★ ★

BLACK GRANITE ANGLE PLATE FOR INSPECTION OR ASSEMBLY OPERATIONS

A black granite angle plate which can be used with granite surface plates and layout plates has been developed by Collins Microflat Co., 2326 E. 8th St., Los Angeles 21, Calif. Designed for convenient clamping of tools and fixtures, the angle plate can be used for any number of precision inspection or assembly applications. Made from high-quality black granite, the plate is said to be non-glaring, non-rusting, non-warping, non-deflecting, easily washable, temperature-inert, moisture repellent, rigid and unusually accurate. According to the manufacturer, it re-



The simplified PYRO Optical is the Ideal Instrument for direct temperature readings of ANY heated object in your plant. Completely SELF-CONTAINED, PORTABLE, RUGGED, LIGHT WEIGHT (3½ lbs.) and FOOLPROOF. No correction charts, no accessories and no maintenance expenses. Unique design permits temperature determination even on MINUTE SPOTS, Fast MOVING OBJECTS and of the SMALLEST STREAMS.

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THE PYROMETER INSTRUMENT CO.

New Plant and Laboratory, Bergenfield 42, N. J.

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Get a better "SURFACE GRINDER" job at less cost

New **Chatter Resistant, Spring Loaded Spindle

Let us put this spindle in your old radius dresser - - $5.00

RADIUS DRESSER $39.00 Diamond $7.00

ANGLE DRESSER $44.00 Diamond $7.00



ORDER DIRECT on our 10 day money back guarantee



Hardened shaft—bearing adjustable for wear. Diamond always perfectly centered. Easily set adjustable 180° stops.

10" Wheel size for DoALL and NORTON Grinders—$44.00. Diamond $7.00.

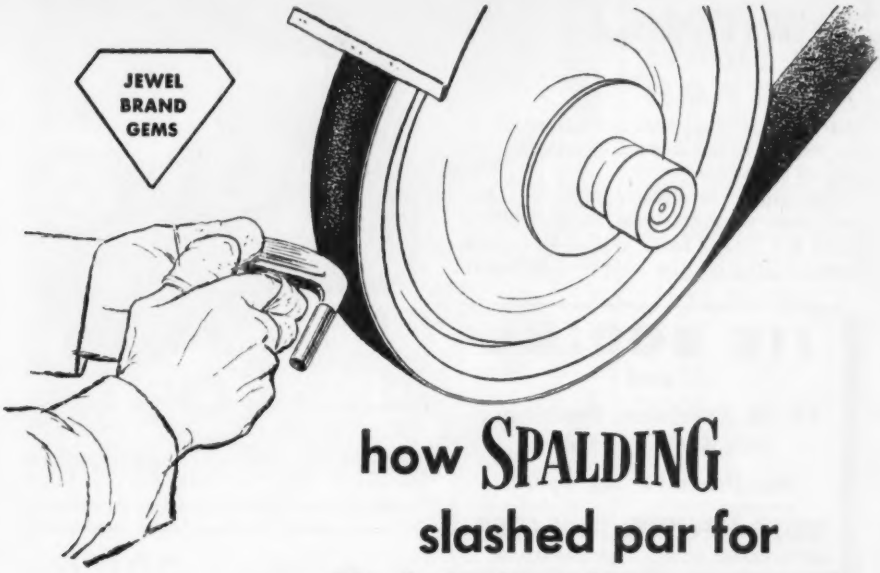
SPECIAL 20" Wheel Size $110.00.

Ball Thrust Bearing. 24 Precision Ground Surfaces. Can be set very accurately with a Protractor or Sine Bar. Works underneath the wheel. Large bearing sufaces.

The "Mighty Midget" Line

SPERMAN METAL SPECIALTIES • 2199 E. 21st ST. • BROOKLYN 29, N. Y.

For more data circle **454** on Reader Service Card



how SPALDING slashed par for golf club finishing costs!

Smoothing and polishing finely balanced stainless steel golf clubs used to be a costly, time-consuming operation — until Jewel Brand Abrasive Engineers helped solve the problem once and for all at the world-famed A. G. Spalding & Bros. Inc., sporting goods plant in Chicopee, Massachusetts. After a careful, on-the-job analysis of the exact finishing requirements, experienced Jewel Brand Engineers were able to select an abrasive belt that not only smoothed and polished precision-made putters and irons faster and easier but brought savings of up to 75%.

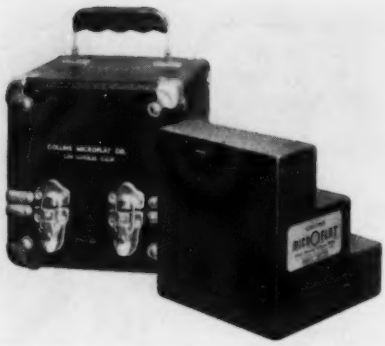
This is just one of many examples of the special knack Jewel Brand Abrasive Engineers have for solving out-of-the-ordinary finishing problems. Combine this ability with the fact that Jewel Brand Abrasive Belts have earned an industry-wide reputation for longer wear plus faster, cleaner cutting action and you have the reason why cost-wise manufacturers everywhere turn to Jewel Brand *first* for finer finishing. Why not prove the advantages of this combination for yourself. Call your nearby Jewel Brand Abrasive Engineer or Industrial Distributor today or write us direct. Abrasive Products, Inc., 507 Pearl Street, South Braintree 85, Mass.



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quires no oiling and connot corrode. Accuracy, it is claimed, cannot be impaired by nicking.

The angle plate is available in standard size combinations ranging from 4 x 4 x 4 inches to 12 x 12 x 12 inches. Larger sizes can be supplied to customer specifications. The angle plate is provided with an attractive black leatherette covered, felt lined, case.



Collins Black Granite Angle Plate with case

For more data circle **85** on Reader Service Card

★ ★ ★

IMPROVED RADIUS DRESSER FEATURES SPRING-LOADED SPINDLE

Sperman Metal Specialties, 2199 E. 21st St., Brooklyn 29, N. Y., has announced the improved "Mighty Midget" Radius Dresser which features a spring-loaded spindle that is claimed to cut out practically all chatter. According to the manufacturer, the spring-loaded spindle feature means that less passes will be required to cut

JIG BORING
and
Large Precision Machining
Done to your specifications
We Have 13 Jig Borers
KIDDE PRECISION TOOL CORP.
37 FARRAND ST. BLOOMFIELD, N. J.

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- Adjustable Vee Block Grip
- Full Length Tool Contact
- Powerful Clamping Force
- No Harmonic Vibration
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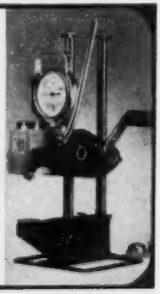
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Specify Right or Left Hand Offset!

FOR CARBIDES (No Rake)	Model P60	P61	P62	P64
FOR HIGH SPEED STEEL (15° Rake)	Model 60	61	62	64
SIZE:	0	1	2	4
TOOL CAPACITY	1/8" to 5/16"	3/16" to 3/8"	1/4" to 1/2"	5/16" to 5/8"

Order from your dealer—Ask for Clark!
ROBERT H. CLARK COMPANY
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MAKE HARDNESS TESTS
With The
KING PORTABLE BRINELL
Puts a load of 3000 kg. on a 10 mm ball. Can be used in any position — even upside down. Removable test head for testing very large parts. Guaranteed to make accurate Brinell tests. Throat: 4", gap 10", wt. 26 lb.
ANDREW KING
Box 606-H Ardmore, Pa.



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PRODUCTION FACTS: *Mill two locking lug recesses in bevel gear blanks in one pass.*

50,000 Monthly Production with GORTON ROTARY DUPLICATOR

Four spindles operate in pairs with their respective rotating fixtures so that the operator unloads and reloads one pair of fixtures while the other two cutters mill two recesses in each of two beveled gear blanks.

Milling operation is mechanical — no electronic, hydraulic or pneumatic controls are used other than air operated clamps.

CAN PERFORM TWO DIFFERENT OPERATIONS AT THE SAME TIME

Each pair of fixtures is controlled by one of two masters mounted within the table. When one pair of spindles is lowered to fixed depth and the cycle starts, the rotation of fixtures and cross movement of table feed the work to the cutters to produce the desired shape. One pair of spindles can perform one operation on two pieces while the other pair performs a different operation on two other pieces.

EASILY MODIFIED TO MEET YOUR NEEDS...

ADDITIONAL TOOLS by GORTON

PANTOGRAPHS
Five models of 2- and 3-dimensional machines for engraving, profiling or die sinking — either manually operated or tooled for automatic cutting cycle operation.

SUPER-SPEED VERTICAL MILLS
Three sizes, designed for fine work in the machine shop, tool room and in die and mold shops.

DIE AND MOLD DUPLICATORS
Three sizes of manually operated precision duplicators — also multiple spindle models, either manual control or automatic cutting cycle.

***Super-Speed* HORIZONTALS, UNIVERSALS, VERTICALS**
Six models, featuring 56" tables (28" travel), 62" tables (34" travel) or 76" table (48" travel).

SWISS-TYPE AUTOMATIC SCREW MACHINES
For high production turning of small slender parts to high precision standards.

•

MACHINES FOR HIGH PRODUCTION

MULTIPLE-SPINDLE ROTARY DUPLICATORS

MULTIPLE-SPINDLE INDEXING PANTOGRAPHS
For multiple operations at production rates with high repetitive accuracy.

MULTIPLE-HEAD ETCHERS
For permanently marking hardened or finished parts.

Write for Complete Catalog 1655-1704.



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SINCE 1893

Tracer-Controlled Pantographs, Duplicators — standard and special . . . Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

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TROYKE
ROTARY TABLES

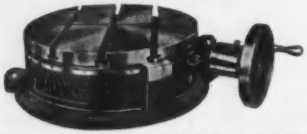
- **Saves fixtures and time consuming setups.**
- **Saves time in circular positioning.**



CAM LOCKING TYPE ROTARY TABLES
Three sizes: 12", 15", 18"
This model is intended for die sinking, bench work, and assembly of machine units when quick rotation and positioning are required.



STANDARD MODELS WORM WHEEL OPERATED ROTARY TABLES
Five sizes: 9", 12", 15", 21"
For die sinking, jig boring, cam milling. Indispensable in wood and metal pattern shops.



HEAVY DUTY MODELS WORM WHEEL OPERATED ROTARY TABLES
Three sizes: 18", 21", 25"
These larger, heavy duty models are used for jig work, planer jobs, and on horizontal boring mills.

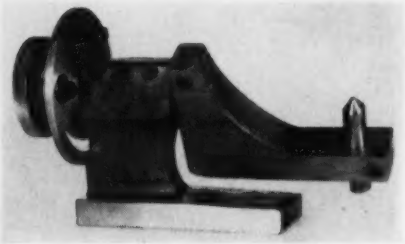
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new shop equipment . . .



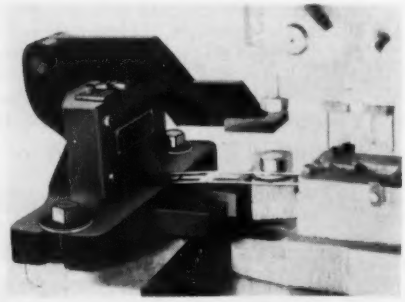
Sperman Improved Type "Mighty Midget" Radius Dresser with spring-loaded spindle

a radius on a grinding wheel and that the dressing diamond will last longer. The spring-loaded spindle is also available for older model "Mighty Midget" Radius Dressers. The dresser utilizes a hardened shaft, and the bearing is adjustable for wear. The unit is available in a standard 10-inch wheel size or in a special 20-inch wheel size.
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★ ★ ★

DEVICE CHOPS SCRAP UP TO 6 INCHES WIDE

A scrap chopper which is designed to handle stock up to 6 inches wide has



Jaco 6-Inch Scrap Chopper mounted on press

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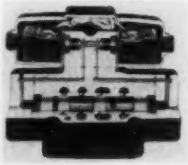
been announced by Jaco Devices, Inc., 98 High St., Hingham, Mass. The unit is powered by the press ram. It clamps to any press bed and handles steel up to 6 inches wide by 0.062 inch thick. The chopper is said to be independent of the die and prevents down time because a spare blade can be installed quickly whenever the cut-off blade needs sharpening. According to the manufacturer, the device is ruggedly built for long trouble-free operation.

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★ ★ ★

FOUR-WAY VALVE

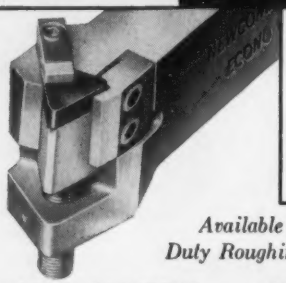
A ¾-inch balanced piston, sleeve-type, 2,000 p.s.i. four-way valve has been announced by Racine Hydraulics & Machinery, Inc., 2070 Albert St., Racine, Wis. The valve is solenoid controlled, pilot operated and subplate mounted. Versatility of design, it is claimed, permits spring-centered, spring-offset or no-spring models that can be readily converted from one type to another. According to the manufacturer, one of the features in valve design is the compact, concealed dust-proof housing of the



Racine ¾-Inch Balanced Piston Sleeve-Type 2,000-P.S.I. Four-Way Valve

1 NEWCOMER **ECONO-CLAMP** TOOLS

2 revolutionary ways to beat production costs



2 NEWCOMER **"THROWAY"** CARBIDE INSERTS

Available in all styles for Heavy Duty Roughing and Accurate Finishing

ELIMINATE GRINDING . . . SPEED PRODUCTION

Here's why modern mass production facilities are saving up to 50% on carbide tooling costs with Newcomer Econo-Clamp Tools and "Throway" Carbide Inserts.

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- **Top clamp locates cutting edge accurately after each indexing.**
- **Hardened steel anvil furnishes a solid, flat seating surface for half length or "Throway" inserts.**
- **"Throway" Inserts give multiple cutting edges without grinding.**
- **One holder uses a full length, half length or "Throway" insert.**

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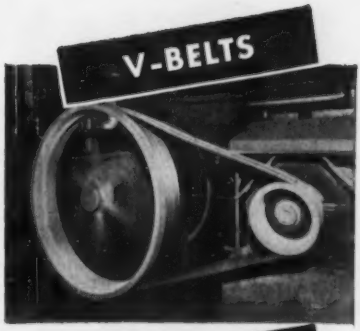
NEWCOMER PRODUCTS, INC.

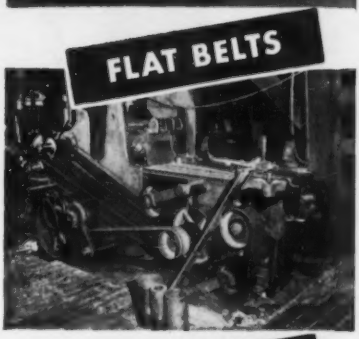
LATROBE, PENNSYLVANIA

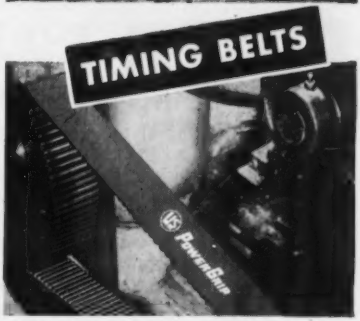
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twin solenoids. Solenoids are fastened to the valve by the cover only. When covers are removed, electrical operation cannot be made, ensuring against loss of covers.

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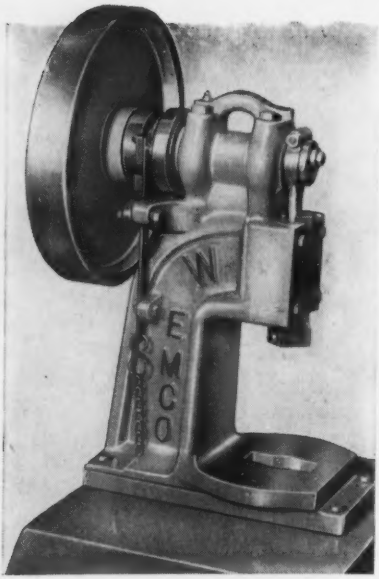
★ ★ ★

PORTABLE DRILL PRESS OPERATES WITH SPINDLE IN ALMOST ANY POSITION

An all-angle drill press which will drill and tap from practically any location with its machine spindle in almost any position and which combines all the advantages of the conventional fixed radial drill with those of the portable has been announced by Sun Tool & Machine Co., 4793 Bennett Rd., Toledo 12, Ohio. According to the manufacturer, the machine can be brought to the job, thus eliminating disassembly of large and heavy workpieces and



Sun All-Angle Portable Drill Press in use



EMCO "W", bench type, 5-ton; also larger EMCO "X", 10-ton. Both sizes also stand-mounted. With or without motor drive.

EMCO POWER PUNCH PRESSES are SPEEDY and SAFE

Versatile EMCO presses excel for punching, forming, stenciling and riveting metal, leather, plastics and other non-metallic materials. Up to 300 operations per minute. "Big machine" speed, strength, rigidity, accuracy, endurance. Compact, fool-proof; simple design—easy to operate. Thousands of EMCOS in money-making use testify to Klaas' dependability since 1921.

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UNUSUAL AIDS TO INDUSTRY

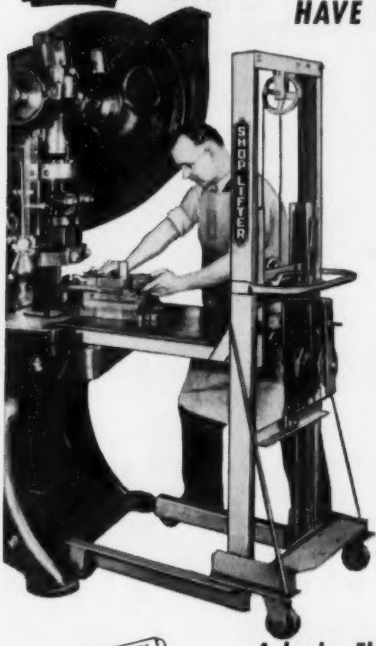
THE KLAAS MACHINE & MFG. CO.
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2 Economy LIFTERS

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SHOPLIFTER

Use the SHOPLIFTER to avoid risk of painful accidents and to protect costly dies. Transport dies from storage area to press. To move dies in and out of press. Use it as an adjustable height bench for working on dies.

Platform lift 4'6", high enough for all press beds, yet overall height will clear any standard doorway.

Width 24". Moves easily between machines —in confined areas.

Spur gear hoist unit — most efficient hoist mechanism — lifts capacity load with only 20# crank pressure.

Friction disc clutch holds load securely — automatically.

Big safety factor for occasional overloading when necessary.

Three capacities to choose from

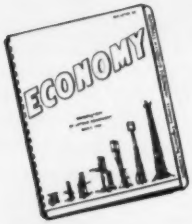
Type D (illustrated) 500 lbs. capacity	$183.60
Type DX—1000 lbs. capacity	350.00
Type DX—2000 lbs. capacity	420.00

ELEVATING TABLE



A husky Elevating Die Table, with big overload safety factor. Use as work bench at each machine.

Dimension 24"x36". Use it for small, medium and large dies. Capacity 2,000 lbs.



Write for New Economy Catalog 55 describing all Economy standard products, special engineered overhead service lifters, and material handling machines.

GREATER LIFTING RANGE

24" minimum to 42" maximum height. Wheels under base-frame—you can get up tight against press or rack.

Four crank studs—two at each end of table for high and low speed adjustment.

Roller bearings in wheels and casters for easy moving.

Floor lock holds table securely when moving DIES on and off.

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Available from your local supplier

ECONOMY ENGINEERING CO., 4507 W. Lake St., Chicago 24, Illinois

Eastern sales office, 342 Madison Ave., New York 17, N.Y.

For more data circle **465** on Reader Service Card

hand drilling and tapping operations. The machine will drill as close as 14½ inches to, and as far as 38 inches away, from its column. The head rotates, on a graduated swivel, a full 360 degrees from vertical, and the drill head rotates 360 degrees on the column. The machine has four speeds—185, 280, 400 and 600 — with a 4-second average speed change.

The drill press has a drill capacity of 1¼ inches and a tapping capacity of ⅝ inch U.S.S. in cast iron and a spindle drilling depth of 5 inches. Maximum distance from the spindle to the base is 59 inches; however, the machine may be ordered in column height to suit individual requirements. Overall height of the machine is 86 inches, and the overall dimensions of the base are 6 by 28 by 43 inches. It requires a floor space measuring 28 by 60 inches and weighs approximately 2,500 pounds. The base is equipped with four roller bearing wheels so that a 50-lb. pull will easily move it from place to place on a concrete floor.

For more data circle **89** on Reader Service Card

★ ★ ★

THREADING MACHINE MEETS VARIED REQUIREMENTS

Designated as the Acme Model XLA, a threading machine which has been designed to meet the varied requirements expected of both a plant maintenance threading machine and also one used for high speed accurate production work has been announced by The Hill Acme Co., Acme Machinery Division, 1209 W. 65th St., Cleveland 2, Ohio. According to the manufacturer, the machine can be adapted

Mold your own LEAD HAMMERS

Here's the inexpensive, fast way of molding and remolding your own lead hammers with this COOK mold and ladle. It produces hammers that can "take it". Simple to operate.



COMPLETE LEAD HAMMER SERVICE

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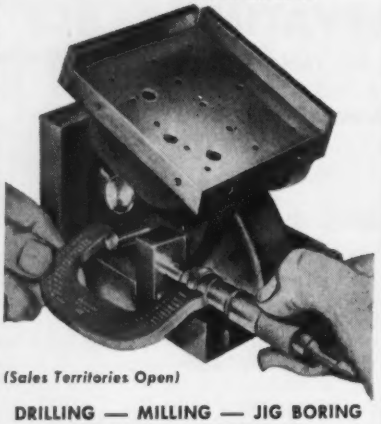
LAWRENCE H. COOK, INC.

67 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.

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ANGLES TO A MINUTE . . . IN A MINUTE



(Sales Territories Open)

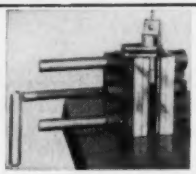
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Mutual Machine Co., Hudson, Mass.

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"Shur-Grip"
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For fast, accurate drilling, reaming, tapping.

Built-in parallels. Handle swivels. V grooves hold rounds up to 2", both vertical and horizontal. 3-way vise holds square, rectangular and round parts.

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CROSSLEY MACHINE & TOOL CO., INC.
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Production-proved for maximum cutting performance and economy

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In a complete selection of 4 types, 295 sizes — air, oil, oil or water and water hardening.

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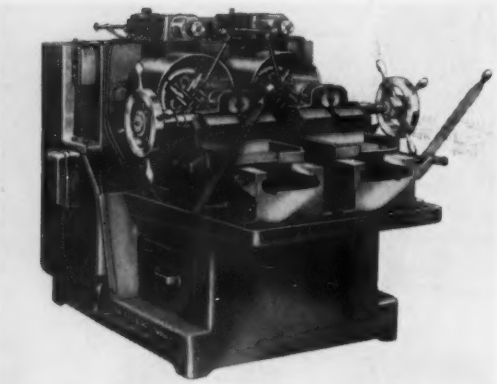
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for threading bolts, pipe, studs, and so on, as well as hollow milling and pointing. Tooing for all standard thread forms is available in a complete range of sizes. Ruggedly constructed, the machine is available in single and double-spindle design in 1, 1½, 2 and 2½-inch capacity sizes. The machine bed is designed for operating comfort and is of sturdy construction. It is equipped with hardened and ground ways for supporting the buiding carriage. The ground spindle is bored to allow the threaded stock to pass through it, so that, by regripping the work, unlimited thread lengths are possible.

The carriages are lever operated and are shimmed to provide wear compensation. A hammer blow handwheel, which provides maximum gripping power, is used to operate the vise jaws. An adjustable trip rod is attached to the carriage to automatically open the die head when any desired length of thread is cut. A constant speed motor with V-belt drive to four-

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POWER PRESSES



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is fast, low
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Save time and money by putting your riveting on the LINLEY RIVETER. Send us samples of your work and we'll gladly and without obligation give you estimates on the time and cost of handling your work the LINLEY way.

Available in sizes and types for iron and cold rolled steel rivets up to ⅜"; larger rivets of softer materials can also be handled.

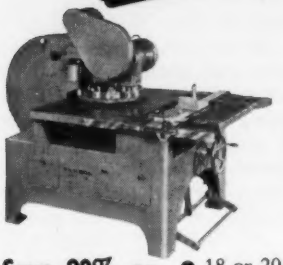
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671 State St. Ext., Bridgeport 1, Conn

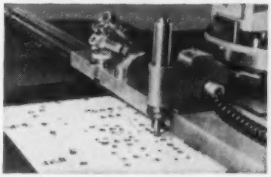
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SAVE 90% with a WIEDEMANN

The RA-41P Turret Punch Press *Pays for itself in 2 YEARS or LESS*



- Unmatched for high speed, low cost duplication of intricate hole patterns in flat sheet metal —low to medium production quantities.

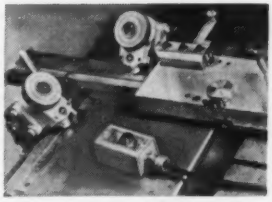


Save 90% on PIERCING

- 18 or 20 punches and dies in turrets ready for use.
- Hole locations are made to a color-coded template—50 or more holes per minute.

Save 90% on TEMPLATE MAKING

- Press can be supplied with optical dimensioning instruments for template making.
- These templates are used with the RA-41P as well as for other applications. Drill jigs, prototypes, etc. are also produced to a tolerance of ±.002" in 10% of the time usually required.



Wiedemann ships each press tooled—ready to produce your parts as soon as the machine is leveled and connected to your power line.

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WIEDEMANN MACHINE COMPANY

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for toolroom or production-

Large T-slot table, machine vise and holding tools—articulate arm (adjustable height) and assortment of tap spindles permit tapping of an infinite number (and number of sizes) of holes without changing set up of work on table. Convenient bench-high bed on Cast floor legs. Movable pedestal has ground column with positioning clamp nut. Spindles guided perpendicular in wide bushing guide.

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MELROSE PARK • ILLINOIS

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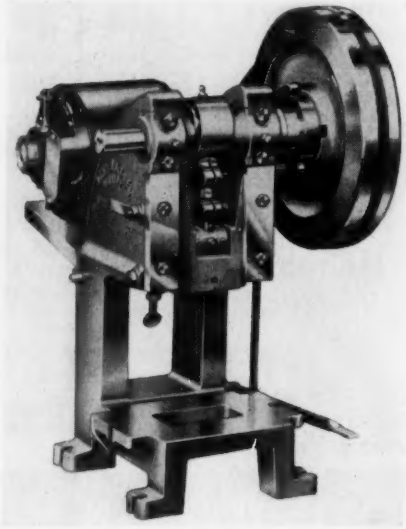
step sheave offers ample spindle speeds for threading all diameters within the range of the machine. Double spindle machines are equipped with a separate motor and starter for each spindle.

For more data circle **90** on Reader Service Card

★ ★ ★

BENCH-TYPE PUNCH PRESS HAS 2-TON CAPACITY

Designated as the Model B-2, a bench-type power punch press with a 2-ton capacity has been developed by Alva F. Allen, Dept. MM, Clinton, Mo. According to the manufacturer, the rugged structure, rigid specifications and precision construction make the press ideal for the production of small stampings, as well as for assem-



Allen Model B-2 2-Ton Bench-Type Power Punch Press for small stamping production



Who's got my Silicon 70?

Any man in the shop may have it, Charlie! Lots of 'em want Brightboy Silicon 70, and the other multi-use textures, too! Don't worry. If there aren't all the Brightboy wheel textures in your toolroom now that there should be, your dealer can get them to you pronto. Just ask for them, for only Brightboy can do many definite jobs.

There's a reason why Brightboy is so widely used and demanded. There's a standard "stock" Brightboy wheel "matched" for every job. No time-taking dressing or before-use preparation needed. No annoying delivery delay.

MORE: Now you can obtain Brightboy in either ALUMINUM OXIDE or SILICON CARBIDE sizes ranging all the way from extra coarse to extra fine—"cushioned" all through in soft, ABRASIVE GRAINS. Each of these absolutely uniform texture combinations comes in grain firm or tough rubber binders.

Rubber and abrasive work simultaneously . . .

- **BURR, CLEAN, FINISH, POLISH, IN ONE OPERATION**
- **FREQUENTLY SAVE 50% IN FINISHING TIME**
- **PROVIDE THE FINISH THAT IS OFTEN THE FINAL POLISH**



Brightboy's action, application, versatility, will amaze you. You get a completely new concept of finishing, far beyond the range of other methods. Ask your dealer for the NEW BRIGHTBOY CATALOG! Advise us if he cannot supply you. Write us on any problem where finishing is involved.



Brightboy is also manufactured in a full range of accessory products: sticks, rods and blocks for machine and manual operations.

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America's Pioneer Manufacturer of Rubber-Bonded Abrasives

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Brightboy
RUBBER CUSHIONED ABRASIVES

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bly or secondary operations. The press features a quick-action single-pin clutch with simple, positive non-repeat or repeat action and straight ram guides with flat gib allowing the accurate fitting of dies for precision stamping operations. The press has an extra large die space for stamping, forming, drawing, cutting, riveting and blanking of metals, plastics and other materials.

The Model B-2 is driven by a 1/3-h.p. motor through a V-belt drive and has a ¾-inch stroke. The machine weighs 105 pounds.

For more data circle **91** on Reader Service Card

★ ★ ★

MACHINE VISE FEATURES SQUARE BODY

Identified as the "Squar-Vise," a precision machine vice which features a square body, permitting the use of such tools as protractors, squares and indicators while setting up, has been announced by Kearsarge Tool & Mfg. Co., RD 3, Erie, Pa. According to the manufacturer, the unit is designed to fill the need for a universal holding fixture with the accuracy of an angle plate and is equipped with two quickly removable and infinitely positionable clamps. The vise, it is claimed, will stay square when clamping pressure is applied and can be clamped to the machine table in various positions. It is available in 4½ and 6-inch models, with or without a V-groove for holding round stock.



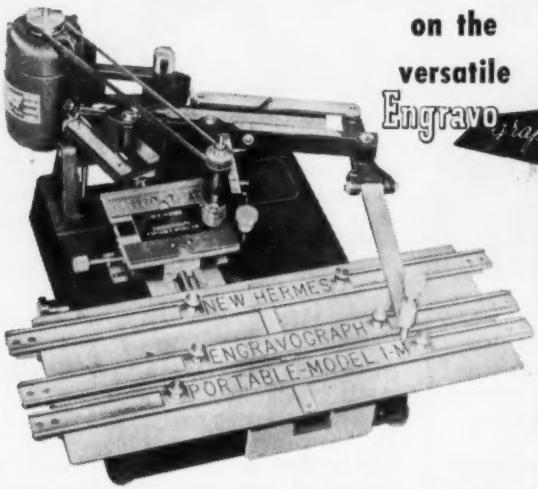
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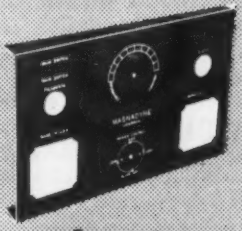


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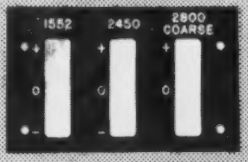
shear it



bend it



form it



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So simple to engrave Gravoflex. Lettering will stand out permanently on contrasting background. No paint needed.

10,000 Engravographs in use for engraving on metals and plastics. Only the Engravograph has these patented features:

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- **Self-centering holding vise.**
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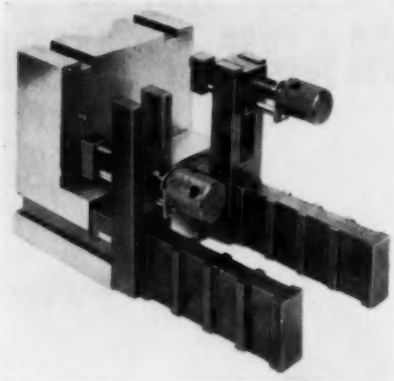
Engravograph Booklet IM-27 • Gravoflex Booklet G-27

NEW HERMES ENGRAVING MACHINE CORP.

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Clamp parts are made from alloy steel, heat treated for maximum strength. The vise body is said to be strong and proportioned so that it will not be distorted out of square when clamping pressure is applied for heavy machining. Only the jaw which comes in contact with the work is made of soft steel to prevent marking of finished surfaces.



Kearsarge Precision Machine "Squar-Vise"

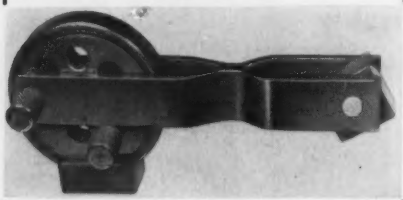
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★ ★ ★

MACHINE PERFORMS CLOCKWISE AND COUNTERCLOCKWISE BENDING OPERATIONS

Identified as the Series 1400-A, a horizontal semi-automatic tube bending machine designed for both clockwise and counterclockwise (left and right-hand) operations has been an-

INSTANTLY ADJUSTABLE WORK HOLDER
(PATENTED)



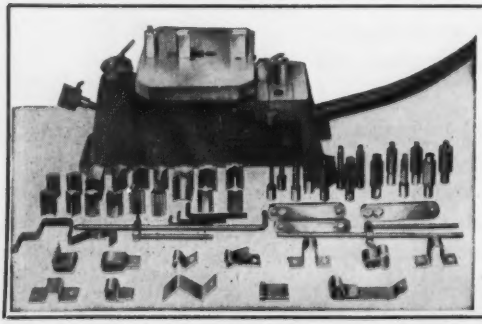
The ultimate — ending costly setups and production delays. Down time becomes production time. This clamp will outperform any other Work Holder Clamp in simplicity, usefulness and cost. Adjustable to any height to suit.

Exclusive Distributors wanted.

Other **WOHLNIP** *Products:*
Collet Stops, Non-Rotating Drill Stops, Drill Extractors

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BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies ,Etc.

AIR OR HAND MODELS FOR UP TO 1/4" to 4" MATERIAL

Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.
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THE MODERN SOLUTION TO TAPPING PROBLEMS

CONSISTENTLY UNIFORM THREADS

BECAUSE . . . taps float "weightlessly" in and out of the hole. The exclusive patented "Tapmatic Floating Action" feature eliminates human errors and results in consistently uniform threads.

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BECAUSE . . . tapping is not dependent upon operator's sensitivity and "reflex-actions." Steady, precise mechanical action takes over as Tapmatic *"thinks for the operator."* Production becomes fast and profitable.

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BECAUSE . . . the "Tapmatic Floating Action" and the "Tapmatic Positive Torque Adjustment Clutch" combination eliminates "lead pressure"—stress on taps is drastically reduced. Tap life increase ranges up to 400%.

LESS TAP BREAKAGE AND WORK SPOILAGE

BECAUSE . . . the positive torque adjustment clutch *stops tap instantaneously* when tap becomes dull, loaded or bottoms in blind hole tapping.

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TAPMATIC

CORPORATION

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FOR A WIDE RANGE OF JOBS



THE *JOHNSON 706* HARDENING, TEMPERING and ANNEALING FURNACE

Select any temperature you require from 300° to 1875° F. Get clean, uniform heat at low cost. The Johnson 706 is easily regulated. Six direct jet bunsen burners have separate valves and pilot lights. Firebox 7 x 13 x 16½ lined with high temperature refractory. Counterbalanced door opens upwards.

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571 E AVE. N.W., CEDAR RAPIDS, IA.

JOHNSON
FURNACES FOR INDUSTRY

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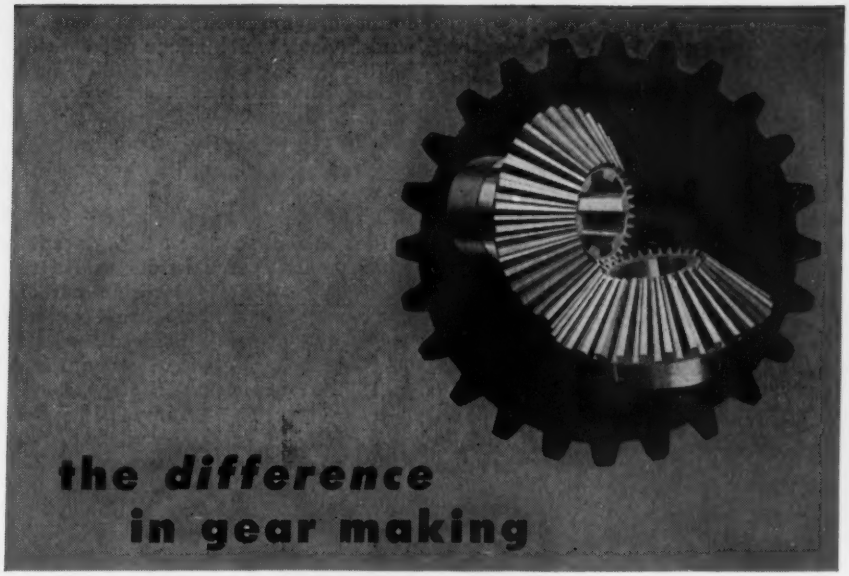
nounced by Pines Engineering Co., Inc., 643 Walnut St., Aurora, Ill. The machine is designed with an extended main spindle and double ways mounted on the top and bottom of both the stationary and swinging arms. The unitized head and top assembly is double-hinged to the base which permits turning over the entire assembly 180 degrees. This feature is said to permit handling bending operations in either direction and interchanging tooling quickly and easily.

The bender has a maximum capacity for handling such tough jobs as 1-inch o.d. 16-gauge steel tubes. It has a self-contained hydraulic system, easy lever-operated toggle-type clamp and pressure die holders, manual angle-of-bend selector with either a six or eight-position turret and a 3-h.p. ball bearing motor.

According to the manufacturer,



Pines Series 1400-A Two-Way Horizontal Semi-Automatic Bending Machine in operation



It's craftsmanship in making gears that counts. The kind of craftsmanship that gives minute attention to every detail of manufacture. Adams gears are custom made to your most exacting specifications. Precision at Adams is more than a word, it's a fetish. When you specify Adams gears you actually get the ultimate in precision craftsmanship. It makes a big difference.

The Adams Company, 1942 Cypress St., Dubuque, Iowa

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The ADAMS Company

Dubuque, Iowa, U. S. A.

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GEARS

FINE GEARS MADE TO YOUR SPECIFICATIONS

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the machine is especially compact to occupy small space, yet has sufficient oil reservoir capacity to handle long production runs at full speed without over-heating. Clamp and pressure die holders and the bending form are made so that they can be quickly and easily removed and remounted. The bending forms are mounted securely on two studs, one of which is equipped with a hold-down nut.

For more data circle **93** on Reader Service Card

★ ★ ★

CENTER HAS REPLACEABLE CARBIDE TIP

Identified as the "Grip-Tip," a center which consists of a holder and a replaceable carbide tip has been announced by Detroit Reamer & Tool Co., 2830 E. Seven Mile Rd., Detroit 34, Mich. The rugged folder is made of tool steel and is available in several standard Brown & Sharpe, Morse and Jarno shank tapers. Solid carbide tips are available in ¼ and ½-inch diameters and are said to be accurate to 0.0005 inch. Special shank tapers and tip diameters can also be furnished to user specifications. Male or female carbide tips are inserted or removed from the holder by simply turning a screw. An adjustable screw in the shank of the holder positions the depth of the carbide tip in the holder. According to the



Stop dust quickly, at lower cost, with Dustkop. Thirty-seven standard models *ready to use* and available from stock. Dustkop conserves floor space, reduces maintenance. Collects almost all types of industrial dusts. Write for descriptive literature.

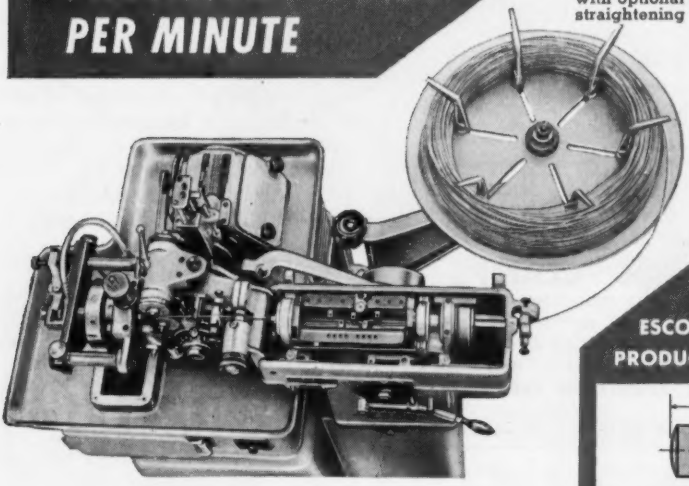
Also a complete line of Mist Collectors

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GET UP TO 100 SMALL PRECISION PIECES PER MINUTE

Below: ESCO ROTOMATIC DS 2 with optional wire-straightening attachment

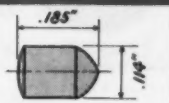


PARTS UP TO 5/32" DIA. X 1" LONG MACHINED AS CLOSE AS ± .00025" FROM COILS OR BARS

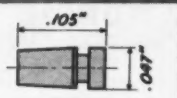
A Swiss automatic form-turning and cut-off machine with optional wire-straightening attachment—you get high-speed production from coils or bars of any length. Coil-feeding speeds and economizes your operation by eliminating bar ends and bar loading time. Machining is done by two cutting tools mounted in a cam controlled tool head. The tool head rotates around material which is fed, guided, and clamped by a collet and a guide bushing. Machined parts are smooth, straight and *entirely burr-free* when they are delivered to the tray *separate from the chips.*

Get more information today about this machine and see how it can boost your production and cut your costs.

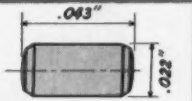
TYPICAL ESCO ROTOMATIC PRODUCTION RATES



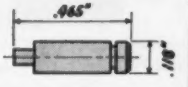
100/min.—brass



63/min.—nickel-silver



50/min.—nickel



10/min.—mild steel

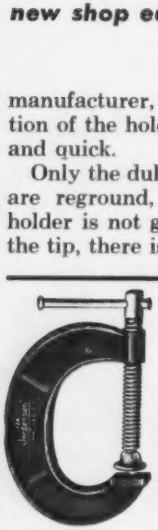
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COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

For more data circle **483** on Reader Service Card

manufacturer, the unique clamping action of the holder on the tip is positive and quick.

Only the dull or chipped carbide tips are reground, and because the steel holder is not ground when sharpening the tip, there is said to be less clogging



Detroit "Grip-Tip" Center with carbide tip

of diamond wheels. The center, it is claimed, affords full utilization of machine productivity by keeping downtime for replacement of centers to a minimum. Also, the Grip-Tip design permits regrinding of carbide tips at a central location rather than at individual machines.

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★ ★ ★

PRODUCTION PROFILE BENDER OPERATES WITHOUT AIR CYLINDER

Pedrick Tool & Machine Co., 3640 N. Lawrence St., Philadelphia 40, Pa., has developed a production profile bender which operates without an air cylinder or any similar fixture and which will handle pipe, tube, strips, shapes and bar stock in production quantities. According to the manufacturer, the action is a combination of a die-type bender and roll bender and is provided with an adjustable cam which wipes the piece into the die at the correct distance from the point of bend. It is believed that the machine will

insist on famous "Jorgensen" "C" CLAMPS

Also bar clamps, hinged clamps, spring clamps, etc.

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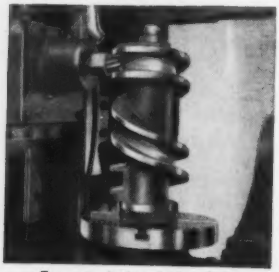
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"The Clamp Folks"

RUGGED! 436 N. Ashland, Chicago 22, Ill.

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"KNOWHOW" . . . to save time and money

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THE ROWBOTTOM MACHINE CO.

WATERBURY, CONNECTICUT

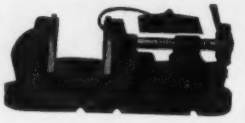
Also Cam Milling and Cam Grinding Machines. *Details on request.*

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GEM VISES

"Standard of Efficiency"



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Write for complete information.

J. E. MARTIN MACHINE CO.

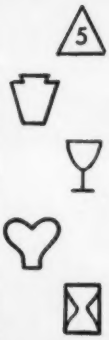
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with INSPECTION and CODE STAMPS



These inspection and code stamps enable a manufacturer to retain control of his product wherever it goes. A single glance can provide such information as the identity of a welder, inspector, operator, or assembler —heat number, lot number, material or date of manufacture.

Choose your own code from any of 300 stock designs, available in any desired size, in either the economical HI-DUTY Brand or even longer-lasting HI-LOY Brand. You'll get permanent identification through use of code designs, with key letters or figures if desired.

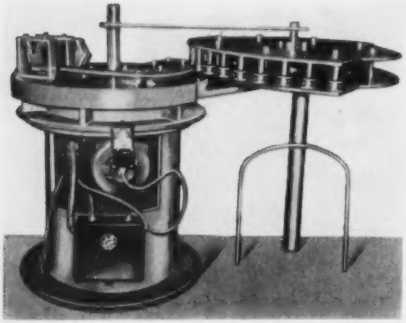
"IF IT'S WORTH MAKING, IT'S WORTH MARKING"...

Geo. T. Schmidt marking engineers will help you develop a code control plan without obligation. Write for particulars.

GEO. T. SCHMIDT, INC.

1806 West Belle Plaine Avenue Chicago 13, Illinois

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Pedrick Production Profile Bending Machine

form any shape up to 360 degrees, comprising simple or compound bends, as long as the finished shape is not too big to be placed on the rotating table. Since the table has no standard size, almost any size can be produced up to approximately 6 feet square. Shapes and bar stock may be handled to almost any reasonable radius, but since no internal support is used, it is apparently necessary to increase the effective radius of the shortest bend by about 25 per cent over that of a simple bender, in order to get a flat free, wrinkle free bend in thin wall tubing.

Besides the bending of parabolas and ovals, the machine is said to be capable of bending frames comprising four right angles with straight sections between, where all of the bends are made in one operation. Since the speed of the machine is approximately one revolution in 20 seconds, the manufacturer claims that it is theoretically possible to make two passes in a minute, depending upon the ability of the operator to load and unload. The machine is applicable for the tubular furniture trade, as well as for all shapes and contours such as hard-

MICRO-HEIGHT GAUGE
BY FAIRFIELD GAUGE CO.



NO OTHER GAUGE COMPARES FOR FAST, ACCURATE LAYOUT AND MEASURING

Capacities to 6" when used with this Fairfield Gauge 3" Riser

The Micro-Height Gauge is a precision instrument, finished in satin chrome, which reads like a micrometer and measures from zero at base to 3" in thousandths.

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ELIMINATES:

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ware on motor cars and trucks, railroad cars and the roof trusses for buses.

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★ ★ ★

HYDRAULIC TUBE MARKER FEATURES FULLY AUTOMATIC OPERATION

A hydraulic tube marker which is said to be capable of rolling a trade mark and part number on mild steel thin-walled tubes at the rate of from 2,500 to 3,000 per hour in a fully automatic operation has been announced by Geo. T. Schmidt, Inc., 1806 Belle Plaine Ave., Chicago 13, Ill. Designed for production line operation, the machine incorporates a Geneva-type feed-



Schmidt Hydraulic Automatic Tube Marker

Peaslee

TAPER PINS

STANDARD
AND
SPECIAL
Stainless Steel
PRECISION GROUND
ALSO
SMALL PARTS
DOWELS – STRAIGHT
FORMS
MADE TO BLUEPRINTS

DEALERS INQUIRIES INVITED

PEASLEE METAL PRODUCTS CO.
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REID

Tool Room Accessories
C.I. Hand Wheels

Fine grain cast iron. Rims and handles are ground and polished to high lustre. Top quality. Many sizes. Low prices.
There's a wide line of REID Accessories such as C.I. Hand Knobs, Machine Handles, Ball Handles, Spherical Washers and many other items at low prices.



COUNTER BALANCED

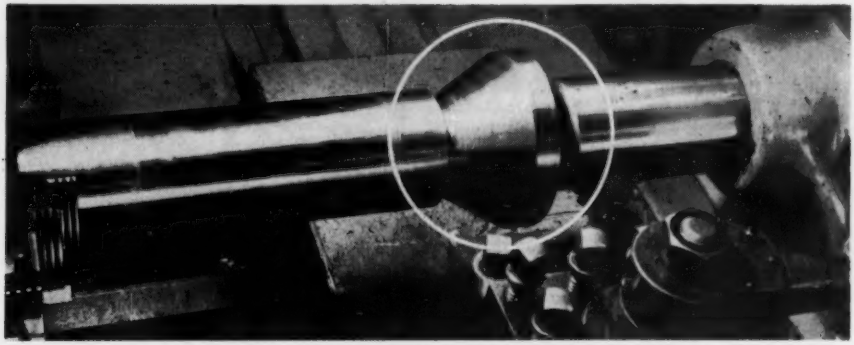


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NEW 56-Pg.
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MUSKEGON HEIGHTS, MICHIGAN

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ROOFE LIVE CENTERS
ASSURE
MAXIMUM ACCURACY!

Users everywhere praise ROOFE Live Centers for increasing production, lowering costs and for giving maximum accuracy.

Made of the finest alloy steels, standard types are available in Morse Taper, Brown & Sharpe, Jarno, straight or special shanks to your specifications. Write for catalog.

Reliable distributors wanted.

HOUSTON GRINDING & MFG., CO., Inc.
2110 QUITMAN STREET ▪ HOUSTON 10, TEXAS

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ing mechanism which receives the parts from the preceding operation and deposits them in a rotating spider.

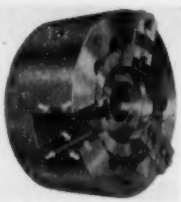
During marking, a retractable arbor supports the parts to prevent distortion of thin-walled tubes. After the part is marked, the spider carries it to the discharge chute and the next operation. The hydraulic action is said to ensure clean marking of uniform depth since the machine compensates for variations in stock thickness.

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★ ★ ★

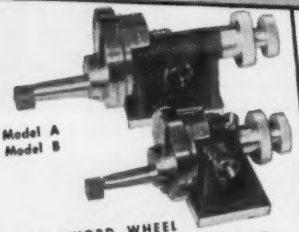
AIR CHUCK FEATURES HARDENED KEY WAYS

Designated as "Ajust-Tru," an air chuck which features hardened key ways to minimize wear and increase chuck life has been announced by Buck Tool Co., 214 Schippers Lane, Kalamazoo, Mich. According to the manufacturer, the chuck is accurate to 0.001 inch, and the jaws can be machined in the toolroom, saving the down time of fitting on the chucking machine. The hardened jaws, it is claimed, can be used for all operations, and jobs run intermittently without the need to retrue the jaws for each setup. Final accuracy adjustments can be



Buck "Ajust-Tru" Air-Operated Chuck

Improve Your Operating Efficiency, Quality and Profits with these LAST WORD Metal-Working Products!



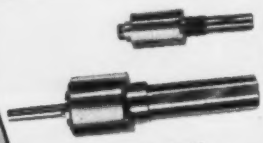
Model A
Model B

LAST WORD WHEEL DRESSERS FOR RADIUS AND TANGENT ANGLE DRESSING — AVAILABLE IN 3 MODELS
MODEL A—For grinders using wheels up to 20" dia MODEL B—For small model surface grinders with 7" max wheel dia MODEL C—Compound Dresser. will compensate for compound angles involved in grinding form tools.

Model C



SAMSON "Heavy-Duty" OFFSET BORING CHUCK—Has positive centering feature for drilling and milling operations. Complete accessories available.



GRAY-GRIMES FLOATING DRIVER—For reaming, tapping, valve seating and similar operations. Can be supplied with standard or special shanks and adaptors.



GRAY-GRIMES AUTOMATIC STEADY-REST FOR O.D GRINDING—Permits grinding complete length of shaft maintaining constant pressure against work-piece as stock is removed.

Mfg'd by Gray-Grimes Tool Co.

Send for complete data



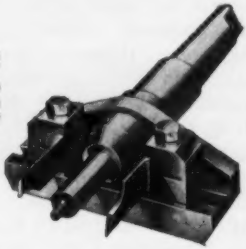
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BOREMASTER is not just another Trepanning Cutter, but a real heavy duty tool. Stock is removed in one piece eliminating waste. Remember . . .

TIME SAVINGS + MATERIAL SAVINGS = COST SAVINGS

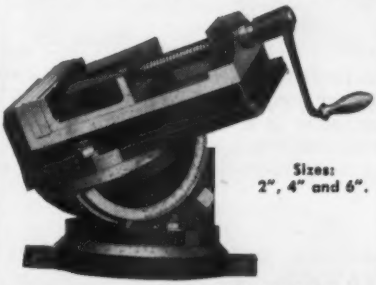
• *Write us today for complete details!*

KARL A. NEISE

404 4th Ave., Dept. MMS, New York 16, N. Y.

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TOOLMAKERS!



Sizes: 2", 4" and 6".

NOW SET-UP *FASTER*--

Save time on intricate, angular set-ups with the fully universal MASTER MULTI-SWIVEL VISE. Three swivels instantly set any compound angle. Used worldwide. Interchangeable platens optional.

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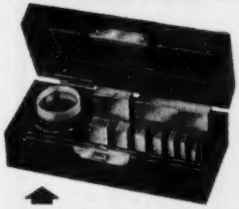
80 BATTERYMARCH ST., BOSTON 10, MASS.

For more data circle **498** on Reader Service Card

ULTRA-CHEX GAGE BLOCKS *for Every Need!*

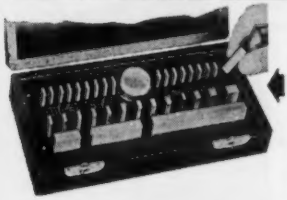
Supplied in one Superior Accuracy

5 MILLIONTHS ± ACCURACY



9 Block Set $22.50

OPTICAL PARALLEL $5.00

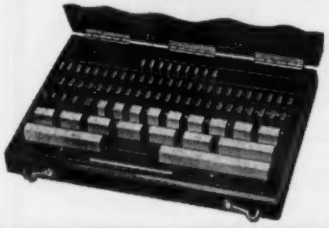


Quick Delivery on Small Standard Sets

34 Block Set $125.00

INCLUDING OPTICAL PARALLEL

All Sets at "Money Saving Prices" due to Mass Production Methods.



82 Block Set $275.00 Complete

This Set will supply the needs of any discriminating shop that must work to gage-block precision.

Dealers: Here's a real profitable line!

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200 MM LAFAYETTE ST. • N.Y. 12, N.Y.

For more data circle **499** on Reader Service Card

made under full air pressure. For safety, the chuck keeps its gripping power should the air line break. The chuck is available in 6, 8, 10 and 12-inch sizes with either two or three jaws.

For more data circle **97** on Reader Service Card

★ ★ ★

SECOND OPERATION MACHINE FEATURES INSTANTLY VARIABLE SPINDLE SPEEDS

Identified as the Model DSM59, a second operation machine which features instantly variable spindle speeds has been announced by Hardinge Brothers, Inc., Elmira, N. Y. A simple touch of a button is said to change the spindle speed instantly to any desired rate between 230 and 3,500 r.p.m. A control box located conveniently over the headstock allows the operator to increase or decrease the speed of the spindle to obtain the most efficient chip removal and surface finish. The machine does not have to be stopped to make spindle speed changes. According to the manufacturer, operations on the machine minimize expensive tooling, upkeep and down time of automatics by enabling the chucking of partially finished parts for performing close tolerance turning, forming, boring, drilling, threading and facing rapidly with low-cost tooling.

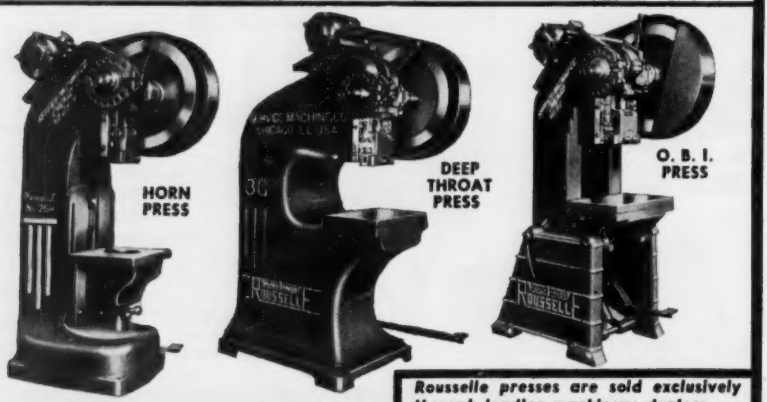
The machine also features a lever-

★ ★ ★ ★ ★

Expect *More* with a ROUSSELLE

More **strength where it counts...**
More **accuracy where it's needed...**
More **simplicity where it helps...**
...to turn out first rate work FAST with steady, dependable regularity

You'll like the economical run-of-job cost, the simpler maintenance, the easier set up and operation and the wider variety of work each one can handle. And YOU'LL LIKE THE PRICE when you compare Rousselle specifications and quality . . . Ask for condensed catalog.



Rousselle presses are sold exclusively through leading machinery dealers.

SERVICE MACHINE CO.

Mfrs. of Rousselle Presses
2310 West 78th Street - Chicago 20, Ill.

For more data circle **500** on Reader Service Card

ENGRAVE STEEL AND OTHER METALS or MATERIALS including PLASTICS



Model UE-3

On a PREIS-PANTO
2 or 3 DIMENSIONAL Engraving Machine

Several models available for engraving steel stamps, medallion dies, ring dies, branding dies, name plates, small tools and machine parts.

H. P. PREIS ENGRAVING MACHINE CO.

657 U.S. ROUTE 22 HILLSIDE, N. J.

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Hammond's OF KALAMAZOO

Model "400"

HORIZONTAL or VERTICAL



4" ABRASIVE BELT GRINDER

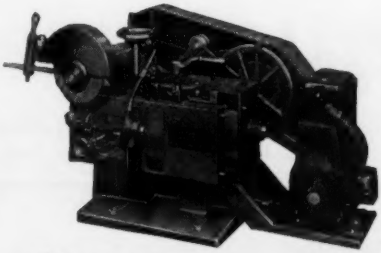
Eliminate costly hand filing, grinding, deburring and many other operations . . . There are "101" applications for the 400 in your plant. Write for bulletin.

Hammond Machinery Builders

1615 DOUGLAS AVENUE • KALAMAZOO 54 MICHIGAN

For more data circle **502** on Reader Service Card

Are You Cost Minded?



Then figure the *enormous savings* in saw sharpening costs and saw purchases, when a group of 40 to 150 saws can be ground at one time — with the WARDWELL Model 35T.

This recent development sharpens milling, slitting and screw-slotting saws in gangs, in one setting . . . all size saws 2" to 5½".

Completely automatic. Just start machine—it does the rest.

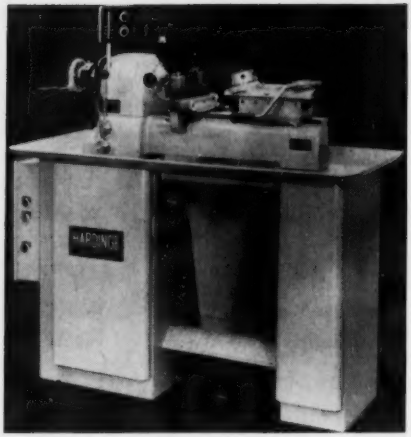
Reduce maintenance costs *now* with the WARDWELL 35T. Write for free bulletin No. 35T today.

WARDWELL
Manufacturing Co.
3803 Ridge Rd.
Cleveland 9, Ohio

Maker of largest line of saw and tool sharpening machines

For more data circle **503** on Reader Service Card

operated ball bearing collet closer which permits opening or closing a collet or step chuck while the machine is in operation, allowing the operator to select a full range of collet tension from light to heavy holding power without the use of extra tools. Fitted



Hardinge Model DSM59 Second Operation Machine with variable spindle speeds

with the Hardinge 5C round collet, the machine has an extra-large 1-1/16-inch capacity. Ease in operation is also said to be afforded by the preloaded ball bearing turret head mounting which eliminates all play between the turret head and turret slide.

For more data circle **98** on Reader Service Card

★ ★ ★

LOCKNUT IS DESIGNED FOR OIL OPERATION NEEDS

Standard Pressed Steel Co., Jenkintown 22, Pa., has developed a locknut

GRANT **RIVETERS**



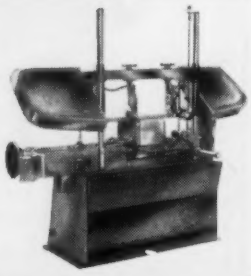
• Pioneers in the riveting field. Head rivets from smallest to 3/4" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. *Write for literature—and don't forget to send samples.*

THE GRANT MFG. & MACHINE CO.
96 Silliman Ave. Bridgeport 5, Conn.

For more data circle **504** on Reader Service Card

INTRODUCING 2 NEW MODELS

Variable Speed Drive—Full Hydraulic Operation . . .



• Provides speeds from 50 to 290 f.p.m. Combined with a graduated metering valve on our fully hydraulic models, this feature permits choice of proper blade speed and pressure for maximum production and blade life from high speed or high carbon steel blades.

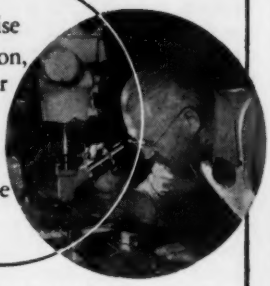
• MODELS W and F—9" x 18" and 14" x 18" capacity, respectively, feature full hydraulic operation. All welded steel base—more rigid for heavier cutting. Welded, one-piece cutting head for swifter blade changes and easier chip removal. Larger capacity coolant and chip tray. Automatic bar feed available to reduce operator's time to a minimum.

W. F. WELLS & SONS

THREE RIVERS, MICHIGAN

For more data circle **505** on Reader Service Card

Precise hole location, easy contour inspection with *new* machine tool microscope



- Wide field of view (¼"); 30x magnification
- Gages accurately to .0001—at a glance
- Mounts on offset bracket, or directly in the spindle
- Fits nearly any machine tool
- Image always appears erect and true
- Ideal for checking slots, contours, surface conditions, or transferring hole locations from template to workpiece.

Write today for complete details.

THE PERKIN-ELMER CORPORATION
Norwalk, Connecticut

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MORE PARTS PER HOUR with *Generall*



FLEXIBLE-POWER STRAIGHTENING PRESSES

Let Us Prove It!

General MFG., CO.
6433 Farnsworth
Detroit 11, Michigan

For more data circle **507** on Reader Service Card

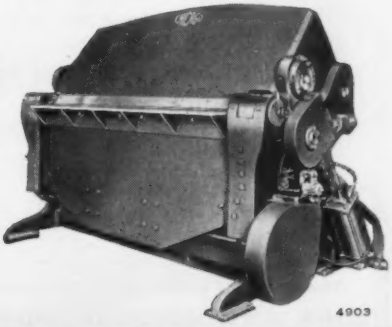
CHICAGO STEEL HAND and POWER

BENDING BRAKES

for Single and Quantity Runs

BENDING STEEL PLATE
and SHEET METAL

Special Bending Brakes
Double Folder Brakes



4903

DREIS & KRUMP MANUFACTURING COMPANY
7418 S. Loomis Boulevard, Chicago 36, Illinois

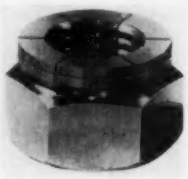
CHICAGO STEEL BENDING BRAKES BOX and PAN BRAKES PRESS BRAKES

For more data circle **508** on Reader Service Card

to meet oil field operation demands for a fastener that will withstand the excessive tightening torques, heavy vibration and great stresses of drilling rigs, blow-out preventing machines and pumping equipment. Added to the Flexloc line, the locknut is made with eight threads to the inch and was developed to give SPS a complete line to meet every need of the oil industry. Company officials claim, however, that it should find a wide variety of applications in other industries.

Primary advantage of the eight-thread series is said to be the helix of the thread which can secure high pressure without excessive wrenching, a vital requirement in the oil industry. According to the manufacturer, the Flexloc all-metal one-piece design permits the fasteuer to serve as a stop nut as well as a locknut to provide this security. The fastener is available in diameters ranging from 1 to 2 inches with intermediate sizes available at ⅛-inch intervals. It can be supplied in alloy steel and, if needed, can be plated with zinc or cadmium.

The fastener is said to get its remarkable gripping ability from its slotted top where six equal segments are closed in to make the inside diameter of the nut smaller than that of the match-



SPS *Flexloc* Eight-Thread Type Locknut

THIS KEYWAY BROACH KIT

Pays For Itself In No Time!



With du Mont *Minute Man* Kits like this you can cut any size keyway from 1/16" to 1" in any bore from ¼" to 3" in one minute for as little as *one cent per keyway.*

BROACH SQUARE HOLES, TOO!

Minute Man High Speed Square Broaches for 3/16" to ¾" squares finish cast or drilled holes much more accurately and far cheaper than by hand. Ideal for boring bars, milling cutters and a raft of applications.



The du MONT CORPORATION, Greenfield, Mass.

MAIL FREE BROACH CATALOG AND PRICE LIST S describing 25 standard kits, 23 standard broach sizes, 71 bushing sizes, square broaches and a wide range of SPECIAL BROACHES to

Name.....

Company.....

Address.....

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THE VISE WITH A
THOUSAND GRIPS



'FLEXIBLE JAWS' grip all shapes. Grips secure and positive for precise milling, drilling and cutting operations. Eliminate the time and expense of blocking and shimming irregular pieces for toolroom machining. Applicable on any machine tool. Try it in your shop. Save time and dollars on small production runs.

•

WRITE FOR INFORMATION TODAY!

AMPOSRIP CONTOUR GRIPPING UNIVERSAL FIXTURES
AMERICAN POSITIVE GRIP VISE CORP.
6-B Olivine St., Willimansett, Mass.

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MARK IRON, STEEL and CARBIDES



THE Etchograph WAY

Original Electric Etcher, Thousands in Daily Use

Mark *hardened parts*, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides — quickly — plainly. • Three sizes to meet all requirements.

• *Write for circulars and prices.*

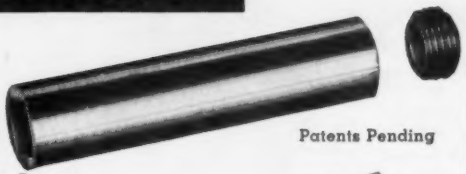
BREWSTER-SQUIRES CO.

P. O. Box 191 Tenafly, N. J.

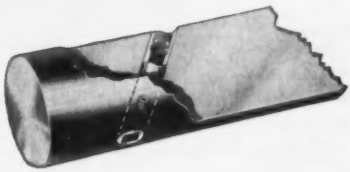
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How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-make square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.
The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.



Patents Pending



SLEEVES MADE IN FOLLOWING SIZES:
3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

STURDY BROACHING SERVICE, INC.

23516 TELEGRAPH ROAD • DETROIT 19, MICH.

Write for Literature

For more data circle **512** on Reader Service Card

ing bolt. Thus, it locks immediately when it is placed on the bolt and will hold tightly at any position. The nut can be used outside the oil industry for steam piping where prestressed bolts are used, for bolting down steam turbines, for cylinder head studs and for similar applications.

For more data circle **99** on Reader Service Card

★ ★ ★

THREADED TAPER PIN FOR ALIGNING AND DOWELING

John Gillen Co., Inc., 2542 S. 50th Ave., Cicero 50, Ill., has announced a taper pin to which threads have been added on the end to provide more versatility. The thread feature permits



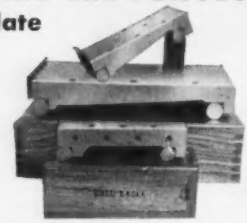
Various types of Gillen Threaded Taper Pins

use as an accurate locating or aligning pin, or for mounting units which require occasional removal or replacement. The pin can be quickly and securely inserted into a blind tapered hole. Threads fit standard size nuts, and by turning the nut, or by leverage, jacking action can be applied to remove the pin from the blind hole. Some applications for the threaded end taper pin are accurate alignment of motors, pumps, compressors, blowers and other operating units to solid bases; and for aligning component parts of machinery. Specifically, the fastening device meets any dowel pin

ACCURATE—LOW COST SINE BARS and PLATES

5″ Sine Plate only $37.50

- Guaranteed Accuracy
- Precision Ground
- Hardened Rails
- Double Normalized
- Tapped Holes
- End Plates
- Solid Oak Case Extra
- Immediate Shipment



Sine Plates and Bars

No.	Cent. Dist.	Width	Price	With Oak Case
1605	5″	3″	37.50	43.00
1610	10″	5″	87.50	95.00
1705	5″	10″	21.75	25.25

FOB St. Paul.

Accurate to .0002″ in center distance and parallelism for the length of the tool. Order Today—from your dealer or direct.

Bald Eagle Tool Co.

Newton Building, St. Paul 1, Minn.

For more data circle **513** on Reader Service Card

MARK OF QUALITY

STANDARD STEEL SPECIALTIES

- **MACHINE KEYS** We can supply a complete line of finished machine keys including gib head and taper keys, rod keys, round end keys, etc.
- **WOODRUFF KEYS** Complete stock of standard keys on hand for prompt shipment. Made from open hearth or alloy steel.
- **TAPER PINS** Available in sizes 7/10 through 10 and lengths from 3/4 inch to 6 inches. Others made to specifications.
- **MACHINE RACK** Can furnish rack from almost any size blank and pitch as well as length to form continuous sections.

Write for catalog

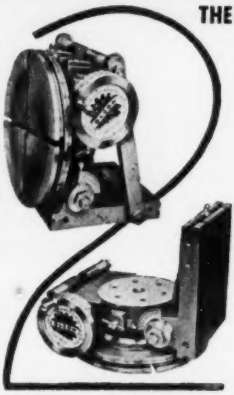
STANDARD STEEL SPECIALTY CO.

BEAVER FALLS • PENNSYLVANIA

Plants: Beaver Falls, Pa.; Hammond, Ind.

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THE TWO IN ONE



COMBINATION ROTARY TABLE AND ANGLE PLATE

PRECISION ACCURACY

WORM adjustable from 0 to 90 degrees.

VERNIER control to within 2 seconds of Arc.

WRITE FOR FOLDER

Makers of Helical Gear Speed Reducers. Worm and Gear Speed Reducers. Standard and Special Gears. Wedge-Lock Turret for Lathes and Turret Lathes.

Open territory available to representatives

OLSON INDUSTRIAL PRODUCTS, INC.

30 W WATER ST. • WAKEFIELD MASS

For more data circle **515** on Reader Service Card

MARK and DEMAGNETIZE IN ONE OPERATION

THE *Luma* TOLEDO, OHIO WAY



The Luma combination etchtool and demagnetizer, etches, demagnetizes, anneals and solders. Permanently marks hardest steel with ease of a pencil. Write for complete information.

Luma Electric Equipment Co.

P. O. BOX 132-MS TOLEDO 1, OHIO

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BIG SAVINGS

- Cleaning and finishing metals, molds, forgings, plastics, etc.
- Removing burrs, carbon, rust, grime, paint, etc.
- Stenciling letters, designs, trademarks, etc.

Cabinet Type

LEIMAN SANDBLAST



Leiman Sandblasts provide the fast, low-cost, safe, uniform way to perform the operations listed above . . . whether mass production or single pieces, large or small. Easily operated by unskilled help. Well-designed, rugged, last for years, priced right.

FEATURES:

- Continuous vacuum abrasive feed
- Heavy gauge welded steel cabinet
- Doors at each end
- Two arm holes with rubber gloves
- Two interior lights
- Foot pedal control
- Large viewing glass
- Use all abrasives

Write for folder and prices

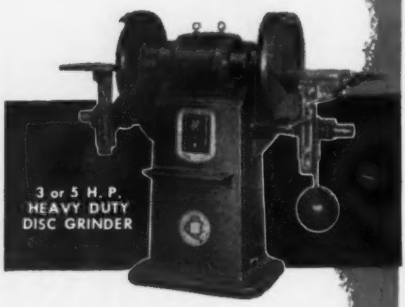
LEIMAN BROS., Inc.

149 Christie St., Newark 5, N.J.

For more data circle **517** on Reader Service Card

"Time Savers in any shop"

QUEEN CITY
heavy duty
DISC GRINDERS
and BUFFERS



Queen City Heavy Duty Disc Grinders and Buffers are designed for the hardest use. Extra heavy spindle, large, high quality ball bearings and special duty motors all contribute to long, trouble-free service.

The complete range of Queen City Grinders and Buffers . . . floor and bench types . . . in sizes from ⅓ to 10 H. P. . . . is described in a free 24-page catalog.

Write for detailed literature

QUEEN CITY MACHINE TOOL CO

QUEEN CITY MACHINE TOOL CO.
391 Kellogg Avenue,
Cincinnati 26, Ohio

"Queen City Grinders—Famous For Over 50 Years"

For more data circle **518** on Reader Service Card

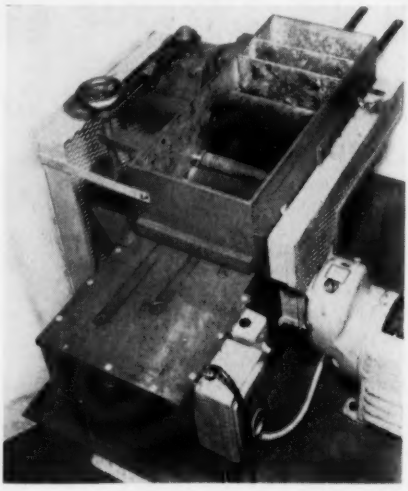
or taper pin application where a blind hole is involved. The threaded pin can be furnished in any length or diameter, accurately tapered ¼ inch to the foot, in various metals, with either turned or centerless ground finishes.

For more data circle **100** on Reader Service Card

★ ★ ★

MACHINE REMOVES SCALE AND SLUDGE FROM HACK SAW BLADES

A hack saw blade scrubber which removes loose scale and sludge from heat treated hack saw blades, or similar types of stock, before they are painted has been announced by The Fuller Brush Co., Machine Division, 3665 Main St., Hartford 15, Conn. The operator merely loads the machine and the scrubbed, clean blades quickly emerge into a basket or onto a convey-



Fuller Hack Saw Blade Scrubbing Machine



DYKEM® STEEL BLUE

Stops Losses making Dies and Templates

Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

THE DYKEM COMPANY
2301F North 11th St. • St. Louis 6, Mo.

For more data circle **519** on Reader Service Card

BOSTON UNIVERSAL ANGLE PLATE



Puts Speed and Profit into Angular Drilling, Milling, Planing, Shaping, Grinding

With a Boston Universal Angle Plate on the job, work is quickly set up on the table and but a few seconds are required to locate it at the desired angle. Indispensable in tool rooms and extremely useful in production runs, the Boston Universal pays for itself many times over by eliminating the necessity of expensive jigs and fixtures.

Horizontal motion is 360 degrees; vertical motion, 120 degrees. Fitted with vernier scale reading to 5 minutes.

Made in several stock sizes. Write today for full information.

US AUTOMATIC BOX MACHINERY CO., Inc. 10 ARBORETUM RD. BOSTON 31, MASS.

For more data circle **520** on Reader Service Card

***What* TO DO ABOUT SPOILAGE LOSSES!**



On tapping and reaming jobs, when spoilage losses get out of control because of misalignment of the work with the spindle, you will find that the trouble can often be eliminated by changing over to Ziegler Tool Holders.

With the Ziegler a faulty set-up is automatically corrected, even though it mounts to as much as 1/32″ on the radius or 1/16″ on the diameter. As a consequence, it is only in cases of extremely great inaccuracies in set-up that spoilage losses can occur.

Save yourself grief on tapping and reaming jobs by always using Ziegler Tool Holders!

PROMPT DELIVERY

W. M. ZIEGLER TOOL CO.

Ziegler ROLLER DRIVE **FLOATING HOLDER** for Taps and Reamers...

13566 AUBURN
DETROIT 23, MICH.

WRITE FOR CATALOG

For more data circle **521** on Reader Service Card

or. The machine can be adapted to scrub any strip stock material on one side or both. When processed, the hack saw blades first pass through the cleaning agents—hot water and rust inhibitor containing detergent — where brushes effectively remove all scale and sludge. A steam chamber, separated by a baffle compartment from the brush chamber, is said to help dry the blades in the next stage of the operation.

For hack saw blade brushing, 0.008 inch crimped phospher bronze wire which is coiled close wound in a right-hand spiral, is used. For other applications, any brush material can be substituted to do the particular job required. The rate of feed through the machine is 41 lineal feet per minute. Two 1-h.p. brush motors, a 1/3-h.p. feed roll motor and a 1/15-h.p. detergent slinger ring motor are required to power the unit.

For more data circle **101** on Reader Service Card

★ ★ ★

BED-TYPE MILLER HAS AUTOMATIC TWO-WAY TABLE FEED CYCLE

Identified as the "HyPowermatic," a heavy-duty bed-type milling machine which is equipped with automatic two-way table feed cycle and infinitely variable feed rates has been announced by The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. The machine is designed for continuous operation on medium to large size parts. Much heavier and more powerful than the superseded models, the HyPowermatic offers increased cutting capacity (up



For more data circle **522** on Reader Service Card



For more data circle **523** on Reader Service Card



For more data circle **524** on Reader Service Card

PRECISION PINS

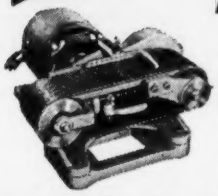
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DOES IT BETTER
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SIMPLEX-M
ABRASIVE BAND GRINDER



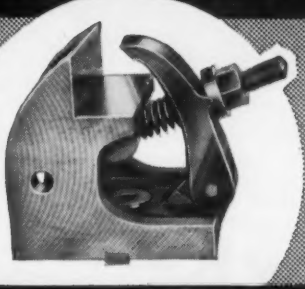
The precision of a machine tool plus the durability of a workhorse. Complete with ½ H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

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SAVE the expense of special jigs, fixtures — Save set-up time, too!



HART MILLING FIXTURES
"Masters of A Thousand Set-ups"

The inexpensive, versatile answer to many different set-up problems. Hart Fixtures hold round, hexagonal, octagonal or square stock aligned with the machine, on miller, shaper, drill press and tapper. Value proved for years in large and small shops; famous for key-way set-ups. Usually sold in pairs; four sizes, capacity ½" to 4½", can be used horizontally or vertically.



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to 50 h.p.) and higher spindle speeds (up to 2,000 r.p.m.) for taking conventional milling or climb milling cuts with either high speed steel or sintered carbide milling cutters.

The standard heavy-duty milling machine is available in three types, designated as the 300, 400 and 500 Series, and is built in plain and duplex styles in 42 sizes of each, from No. 307-183 (36-inch table travel, 7½ h.p.) to No. 550-2614 (168-inch table travel, up to 50 h.p.) The bed ways are unusually long, hardened and ground to an accurate bearing with the sliding table. Ways are square gibbed, an important factor of both accuracy and rigidity.

The machine is provided with an intermittent, dog-controlled automatic table cycle. Feed rates may be infinitely varied throughout their complete range of from ¼ to 100 inches or 150 inches per minute, depending upon machine size, by means of an easily operated feed rate selector dial. The table is driven by a "Hydramech" unit which is enclosed within the bed where it is protected from dust and grit. The Hydramech unit consists primarily of a hydraulic motor, with an infinitely variable arrangement, driving a worm and dual worm wheel which in turn drives twin vertical pinions engaging the table rack. Sixteen spindle speeds can be obtained through change gears and a back gear combination. A choice



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Quarter of a century of Centerless Grinding and Screw Machine Service. • Complete facilities include Heat Treating — Plating — Close Inspection.

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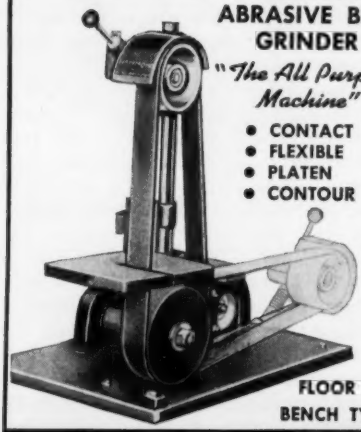
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Hammond of Kalamazoo

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FLEXIBLE
ABRASIVE BELT
GRINDER

"The All Purpose Machine"

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- FLEXIBLE
- PLATEN
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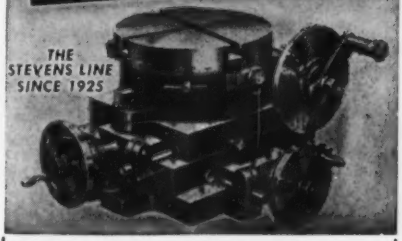
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THE STEVENS LINE SINCE 1925



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LITTLEFORD

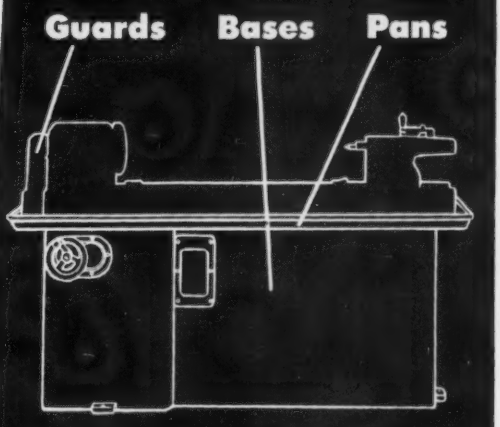
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On time. Littleford's prompt deliveries speed up *your* deliveries.

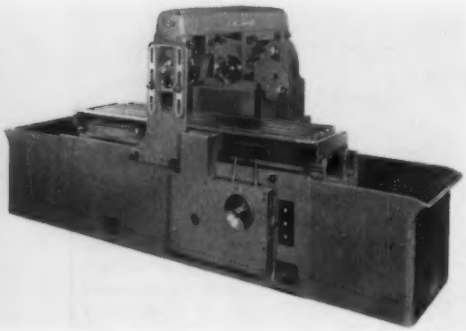
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For more data circle **531** on Reader Service Card



Cincinnati "HyPowermatic" Heavy-Duty Bed-Type Miller with two-way table feed cycle

of nine ranges of spindle speeds are available. The highest group ranges from 50 to 2,000 r.p.m. for 300 Series spindle carriers, 30 to 1,200 r.p.m. for 400 Series spindle carriers and 20 to 800 r.p.m. for 500 Series spindle carriers.

Operating controls are conveniently and compactly grouped on the front right-hand side of the bed at the operator's normal working station. Quick positive starting and stopping of spindle rotation is obtained through two hydraulically operated multiple disc clutches. Lubrication of the principal units is completely automatic. Table ways and the drive mechanism are lubricated by a power driven pump from a self-contained reservoir within the bed. Coolant equipment incorporporates a three-way switch, offering the operator a selection of continuous flow or automatically "on" and "off" with the starting and stopping of the spindle rotation.

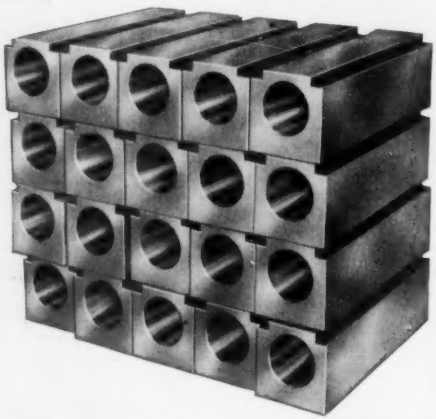
An innovation in design are the chip wipers attached to the underneath side of the table to push accumulated chips from the troughs adjacent

★ ★ ★ ★ ★

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American has recently more than doubled its capacity to manufacture hollow bored and honed parts to 15 inch I.D.—lengths to 27 feet. Heat treating to specified physicals—exacting tolerances and honed finishes rigidly maintained. Send drawings for estimates.



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Benders

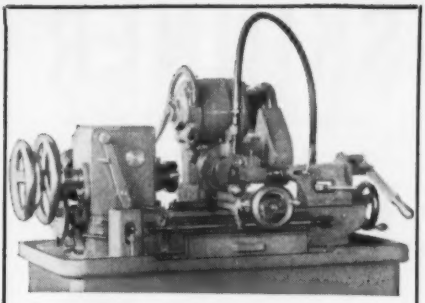
Although this Fisher Bender, or Metal Lathers Bender, as it is also known, was designed primarily for the lathing trade, it is used by many different concerns who need a well-made and easy to operate bender of the following capacity:

7/16" round or square iron.
2" x ⅛" channel iron.
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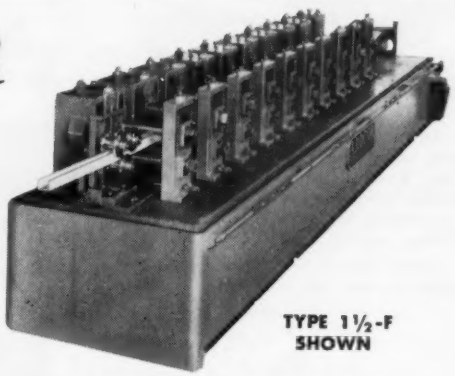
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BOX 48 • WALTHAM, MASS.

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ARDCOR

ROLL FORMING MACHINES...

AVAILABLE IN ALL SIZES AND SPINDLE DIAMETERS



TYPE 1½-F SHOWN

DESIGNERS AND MANUFACTURERS: All Sizes and Spindle Diameters of Roll Forming Machines, Welded and Lock-Seam Tube Mills • Forming Rolls, Tubing and Pipe Rolls • Straightening, Pinch and Leveller Rolls • Cut-off Machines.

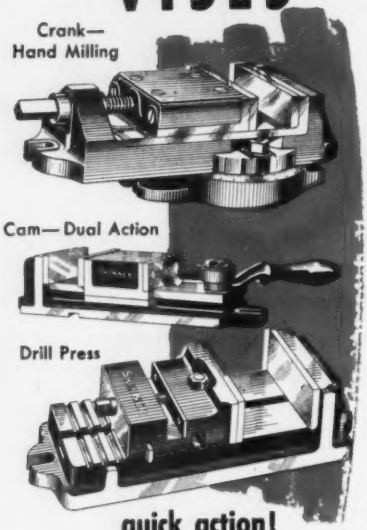
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precision machine

VISES



quick action!
positive grip!

Skinner precision milling machine and drill press vises are unequalled in their fast, positive gripping action. Several models available, with either plain or swivel base, to handle all types of milling, drilling, tapping, etc.

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to the table to the large chip compartments at each end of the bed. Here the chips may be removed without interrupting machine operation.

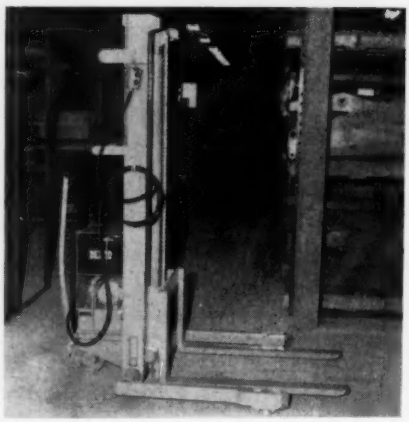
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★ ★ ★

PALLET STACKER FEATURES BATTERY OPERATED LIFTING MOTOR

The Raymond Corp., 88-128 Madison St., Greene, N. Y., has announced that its pallet stacker, originally designed to plug into an electrical outlet, is now being offered with a 12-volt battery-operated lifting motor and an automatic built-in charger. Two 6-volt 125-ampere hour batteries are wired in series to provide the 12-volt current. Batteries can be charged during off duty use to keep the unit ready for a full eight-hour shift operation.

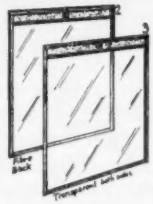
Designed to lift and stack 2,000-lb. pallet loads, the stacker has adjustable base forks which will straddle all pop-



Raymond Battery-Operated Pallet Stacker

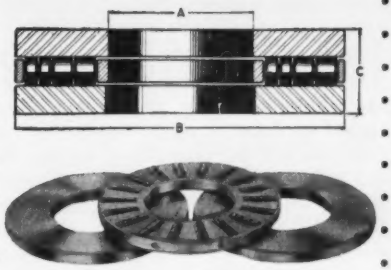
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CYLINDRICAL RACKS
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ACCURATE for service and dependability when you need it!

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Made with flat seats and in various self-aligning types, especially adapted for heavy loads at slow or moderate speeds.
STANDARD SIZES ARE SHOWN IN OUR GENERAL CATALOG, SENT UPON REQUEST.
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(Prices are per dozen)

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Hand 2		4.90	6.80	9.60			
Hand S		5.25	7.35	10.55			
Flat B		4.15	5.50	7.60	$10.40	$13.90	$18.75
Flat 2		4.75	6.35	8.60	12.00		
Flat S		5.15	6.80	9.45	13.10	15.75	20.00
½ Round B		5.85	7.15	9.20	12.10	16.10	
½ Round 2		6.50	7.85	10.20	13.30		
½ Round S		6.95	8.40	10.90	14.30	18.95	
Square B	$ 3.60	4.30	5.80	7.95	10.90	14.70	
Square 2	4.00	4.90	6.65	9.00	12.55		
Square S	4.30	5.50	7.15	10.05	13.70		
Round B	2.75	3.40	4.40	5.85	8.40	11.50	
Round 2	3.10	3.80	4.95	6.70	9.55		
Round S	3.55	4.20	5.50	7.35	10.25	12.75	

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William Reid Co., 2271 Clybourn Ave., Chicago 14, Ill.

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ular size pallets. Lifting forks are also adjustable in width and can be furnished in lengths of 36 or 40 inches. The stacker is positioned manually, and a fifth wheel steering arrangement is said to provide unusual maneuverability. The unit, it is claimed, is especially useful in temporary storage areas, outside warehouses and open areas where electric service is not available.

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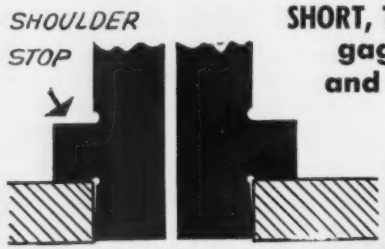
★ ★ ★

ADJUSTABLE ADAPTER NUT HAS FLOATING LOCK

Identified as the Glenlok, an adjustable adapter nut which eliminates broken sections, sometimes referred to as fingers, has been announced by The J. C. Glenzer Co., 1150 E. Nine Mile Rd., Ferndale 20, Mich. The nut features a floating lock which is hinged into the nut itself by peening so it cannot come out and get lost; yet, as shown in the accompanying illustration, it is a separate piece that moves freely



Glenlok Adjustable Adapter Nut with floating type lock



SHORT, THROUGH HOLES gaged easily and accurately



Comtorplug gages only at its very tip and can be shoulder-stopped for short holes to gage all the way through a hole without slipping beyond.
POSITIVE ACCURACY TO FRACTIONS OF .0001"

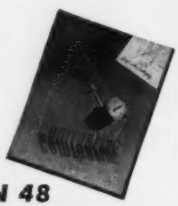
COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from 1/8" to 8" dia.

Unique Advantages

- Positive gaging accuracy to fraction of .0001" regardless of who operates it.
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- Shallow holes, deep holes, inside splines, open-end holes gaged easily.
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- Reaches to bottom of blind holes.
- Gages work while still held in chuck.
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Investigate the gage used by the thousands in jet engine, automotive transmission, household appliance, farm machinery, guided missile and other volume-precision plants. IT MAKES PRECISION GAGING EASY . . . at machine . . . at inspection bench . . . for selective assembly. No other like it—investigate and see why.

COMTOR COMPANY
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GET THE FACTS—REQUEST BULLETIN 48

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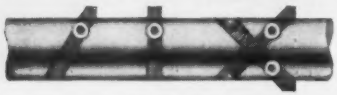
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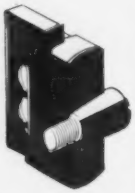
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A BETTER BORING BAR

● because our method of broaching square holes makes a better fit for the tool bit. This means more rigidity and longer life, especially with tungsten carbide.

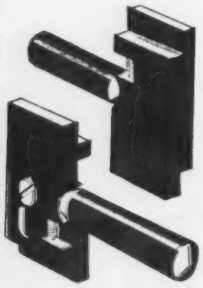
Square hole sizes range from 1/8" up to and including 3/4".



TYPE "B" & "C" CUTTERS

A strong rigid serrated 2-bladed cutter-located in the bar with a taper pin. Bores holes accurately to close limits. Can be expanded and reground giving long life. Sizes 7/8" dia. up to 6".





A simple 2-bladed reaming cutter. Can be expanded and reground. Located in the bar by a hardened V. This V never has to be reground as blades are expanded. Fits other bars with slots

3/8"x7/8" 5/8"x1 1/8"
1/2"x1" 5/8"x1 1/2"

THE DETROIT BORING BAR CO.
688 E. FORT ST. DETROIT 26, MICH.
Established 1927

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new shop equipment . . .

in locking and unlocking. The nut is heat treated and ground so it is always accurate by thousandths of an inch, wherever set. This Genlok nut is the new standard adopted by Glenzer for use on adapters, floating holders and all tools using National Acme threads. The nut locks over milled drift slots or can be used on old-style adapters with milled set screw flats, as well as on the latest type of adapters. The nut was especially designed for making quick tool changes on multiple spindle machines.

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ALL-STEEL PNEUMATIC DIE CUSHION FOR DOUBLE CRANK POWER PRESSES

Designated as the Model HC-22-9, an extra-heavy all-steel pneumatic die cushion for double crank (double



Dayton Rogers Model HC-22-9 Die Cushion

CUT TOOL COSTS

broken tools made like new again with NU-TANGS*

Twisted or broken tangs replaced at low costs on any tool with a Morse Taper (sizes 1 to 6). Hundreds of leading industries save money on drills, reamers, countersinks, cutters, drivers, the NU-TANG way. Prompt delivery. Send for prices—or send tools for repair. All work guaranteed.

NO WELDING! NO SHORTENING! NO SLEEVES! NO DISTORTION!

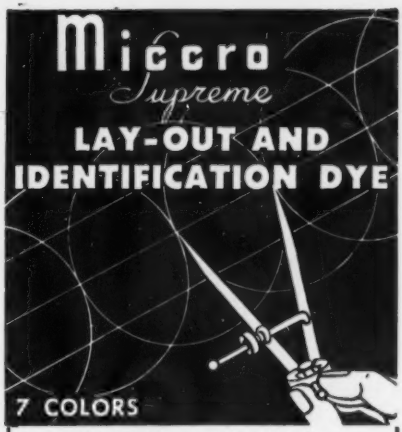
Send them to us like this! GUARANTEED STRONG AS NEW! *We return them like this!*

NU-TANGS INC. 1339 Bates Avenue Cincinnati 25, Ohio

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7 COLORS

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

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Fully equipped modern machine shop with extensive **Jig Boring, Surface Grinding, Horizontal Boring** and **Thread Grinding** facilities as well as modern **Cam Milling** and **Cam Grinding** equipment.

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An amplifying gage of semi-optical design for gaging outside dimensions, lengths and thicknesses precisely and rapidly.

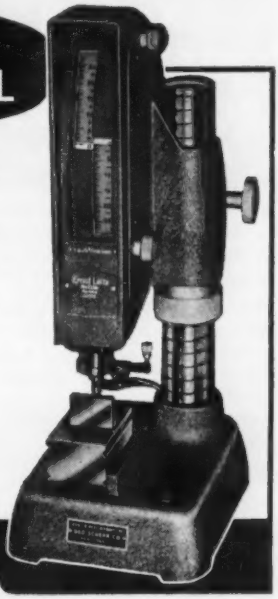
Its unusual design makes it sensitive enough for the finest tool and gage inspection, with the necessary ruggedness for fast, day in - day out - production inspection.

Brightly illuminated screen makes the readings unmistakable, at a glance. Adjustable red tolerance shield shows undersize pieces and green tolerance shield shows oversize pieces.

If it's White - It's Right

Reads in .00005" - Range ± .005"
Capacity 6"

WRITE FOR COMPLETE LITERATURE
In certain territories inspection may be arranged



Geo. SCHERR OPTICAL TOOLS, Inc.

200-MM LAFAYETTE STREET • NEW YORK 12, N. Y.

For more data circle **549** on Reader Service Card

throw) power presses has been introduced by Dayton Rogers Mfg. Co., Minneapolis 7, Minn. The design of the die cushion carries a wall thickness of 1⅛ inches with an overlap of approximately 36 inches. According to the manufacturer, the equipment develops a 38-ton ring holding pressure on a 100-lb. air line. It is provided with a one-shot lubrication system with a hardened and ground pin pressure pad. The unit has a drawing stroke capacity of 10 inches and is said to be so designed that it will compensate for a minimum amount of off-center loading.
For more data circle **105** on Reader Service Card

★ ★ ★

SURFACE BROACH PERMITS HEAVY CUTS ON CAST IRON PARTS

A Red Ring inserted-tooth carbide surface broach designed to avoid chatter and cut tool costs when taking heavy cuts on semi-circular cast iron surfaces is now available from National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich. The broach is a progressive type that features a broach bar having machined integral lugs which back up each of the inserted carbide-tipped tools. By backing up the tools with these integral lugs, minimum tool chatter is said to be assured and tool breakage is minimized. The integral lug broach bar design thus permits heavy cuts to be taken by individual tools. This design, it is claimed, can also reduce the effective length of broach required to finish a semi-circular cast iron surface or a portion of a circular surface. The length of broach required to finish a

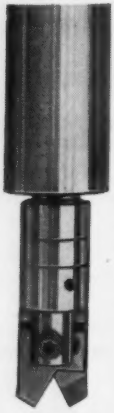
Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS
Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/16" to ¾" U.S.S. Inexpensive — Last for years.

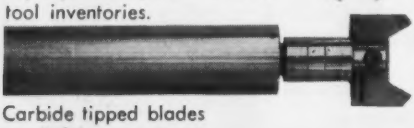
Write for Circular
NIELSEN TOOL & DIE COMPANY
P. O. Box 1067
Berkley, Mich.

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2 HAYDEN WIDE RANGE BORING BARS fill your needs

Any size hole from 1" to 4" can be bored out with 2 Hayden Wide Range Bars. They come in two sizes, 1" to 2"; 2" to 4". Hayden Wide Range Boring Bars impart a smooth finish on the I.D., cut accurately and rapidly, and permit smaller tool inventories.





Carbide tipped blades at slightly extra cost.

HAYDEN TWIST DRILL CO.
8622 Lyndon Ave., Detroit 38, Mich.

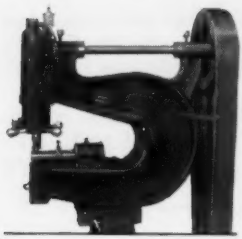
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BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Pa.

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SAVAGE
NIBBLING MACHINES



NOW
TUBE CUTTING ATTACHMENTS
for
ANY SIZE SAVAGE NIBBLING MACHINE
For slotting, cutting off and forming special ends. Cutting by guide lines or template.

Capacity in tube wall thickness to one half rated capacity of Nibbler.
Tube sizes from 1" I.D. to 3½ O.D. Larger diameters for lighter gauges.

Quotation on Request

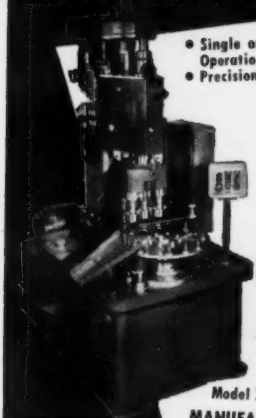
"NIBBLE YOUR COSTS"

W. J. SAVAGE COMPANY
Knoxville *Since 1885* **Tennessee**

PIONEER MFRS. OF NIBBLING MACHINES

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KAUFMAN
TAPPING MACHINES
BUILT FOR SPECIFIC PRODUCTION JOBS



- Single or Multiple Head Operations
- Precision Depth Control
- Non-reversing Motor Drives
- Pressure Lubricated Lead Screws
- Fast, Accurate Rugged Index
- Other Head Units Available
- Other Worthwhile Features.

Catalogs Nos. 754 and 1153 Mailed on Request.

Model 75-24

KAUFMAN **MANUFACTURING CO.**
551 So. 29th Street, Manitowoc, Wis.

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MAXWELL
Automatic RECESSING TOOLS
REDUCE INTERNAL CUTTING COSTS



These fully automatic, quickly adjustable tools save time, cut costs on precision grooving, undercutting, inaccessible spot facing, chamfering, back facing and necking.

They are used with jig or fixture on automatic or manual feed machines. Long-life circular form cutters, or tool bit holders with tool bits may be used. Location and diameter of recess are individually controlled by stop collars, adjustable to within ± 0.001-inch. Five sizes available to pilot into 1" to 2¼" bushings. Furnished with shank to suit.

WRITE TODAY FOR BULLETIN NO. J-F
1151,MC



THE MAXWELL COMPANY
325 BROADWAY • BEDFORD, OHIO

For more data circle **555** on Reader Service Card

given surface with the broach depends on the width of the surface, the amount of stock to be removed and the stroke of the broaching machine.

The round steel broach bar sections have square holes along their length into which standard carbide-tipped cutting tools are inserted. The holes in the bar sections are on radial centerlines that follow a helical path down the broach bar. The broach bar sec-

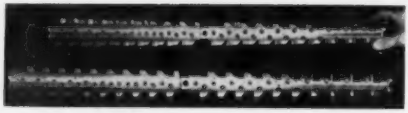


Illustration showing broach bar sections from the Red Ring progressive-type inserted tooth carbide surface broach for taking heavy cuts

Proven PERFORMANCE . . . . .

. . . for all GROOVE inspection
"O" RING GROOVES
SNAP RING GROOVES

. . . Light, easily handled gages with a wide range of gaging applications.

Standard models for checking from 1/4" bore dia. to 5".

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adjustable GAGES



- May be altered for an unlimited number of special applications.
- Standard models available for checking snap ring grooves.

OTHER RELIANT GAGES FOR DIMENSIONAL CONTROL
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SOUTH GATE, CALIFORNIA

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Double End

CYLINDRICAL PLUG GAGE

with Handle

COMPLETE FOR $7.50

24 HOUR DELIVERY

Gages are hardened, ground and lapped to your individual requirements.

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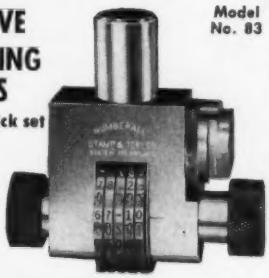
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NUMBERALL

SELECTIVE NUMBERING HEADS

Model No. 83

all wheels quick set



Model 83 Heads for all stamping operations requiring quick selective numbering. Wheels are engraved with direct sight figures at front of machine. Set to the required character by turning the knobs. By pushing the knobs right or left anyone of the wheels may be engaged. The indexed wheel selector knob serves as a positive stop for every wheel. 1/16" to 1/4" size figures. Letter wheels, with up to 11 letters and a blank on each wheel, can also be supplied. Heads are more efficient and durable than old style lever machines. Furnished in sizes from 1 to 15 wheels.

Write for Bulletin MS-83

NUMBERALL STAMP & TOOL CO.

HUGUENOT PARK STATEN ISLAND 12, N. Y.

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Send for Woody Spencer's Handy Tapping Guide . . . all arranged for quick, easy tapping reference. IT'S FREE! Hangs on wall or lies flat on desk.

The Wood & Spencer Company

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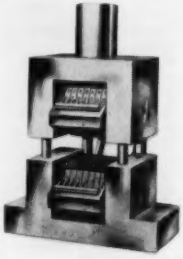
tions are mounted in a cradle in the surface broach holder. A typical design has two rows of inserted carbide tools. One row broaches one half of a semi-circular bearing cap surface and the other row broaches the other half; thus, each tool cuts to full depth and takes a relatively heavy cut to generate the desired form. A progressive type broach of this design is claimed to be ideally adapted to the finishing of case iron surfaces since it minimizes tool abrasion caused by the scaly cast iron surface. Individual carbide-tipped tools are locked in position by a set arrangement that provides a rigid locking feature. Another set screw backs up each tool to provide simple height adjustment after sharpening. The broach can be used on conventional surface broaching machines. The stroke of a particular machine usually dictates the length of the broach.

For more data circle **106** on Reader Service Card

★ ★ ★

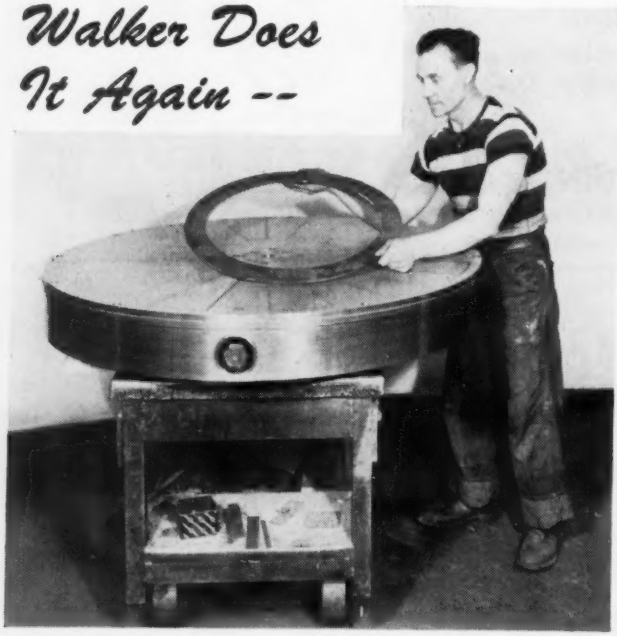
EMBOSSING HEAD

The Parker Stamp Works, Inc., Hartford, Conn., has announced an embossing head which is designed for marking metal tags, identification plates, seals



Parker Embossing Head for metal

Walker Does It Again --

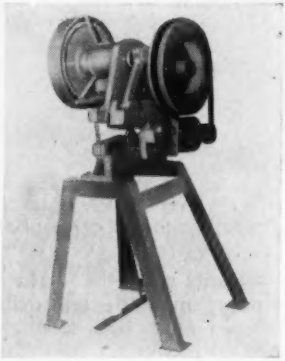


Industry required a 48-inch diameter Rotary Permanent Magnetic Chuck. O. S. Walker Company, Inc., Worcester, Mass., responded by designing and building this permanent chuck, the world's largest—and larger sizes are now available. Whatever your holding problems—magnetic or vacuum—Walker engineers have the answer. They are as close to you as your telephone—Worcester, Mass. PLeasant 6-6293.

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IDEAL FOR THE USERS OF SMALL ANGLES OR FLATS



- No grinding necessary after cut.
- Cut angles up to 2"x2"x3/64" and flats up to 1/4"x4".
- Flywheel with gear drive for power with a small motor.
- A one stroke cycle clutch operated by either hand or foot.
- With clutch open, will make 44 strokes per minute.
- Made of high grade cast iron, hardened clutch and clutch pin, shear steel blades.
- Blades can easily be replaced by taking out several screws.
- From floor to top of machine—56" with stand. Floor to shear blade—36". Floor space required—24"x27".
- THIS MACHINE GUARANTEED FOR WORKMANSHIP AND DURABILITY.
- Price of shear, with motor and switch—$450.00.
- Shipping weight, 645 lbs.

Write for Full Information

BATEMAN FOUNDRY and MACHINE CO.
Mineral Wells, Texas

For more data circle **561** on Reader Service Card



PERFORMANCE!

Modern industry demands TOP PERFORMANCE plus Economy from its production facilities. Both of these features are highly exemplified in this Standard Machine No. S. O. 4132.

Standard's 3 column hydraulic drilling, Counterboring and Taper Reaming machine is equipped with three Standard 25 H-P "DRILL-MASTERS," each column has 14-spindle head with tooling to suit successive operations. Fixtures are moved from station to station on a roller type conveyor. PART; SPROCKET. Operations: Drill, counterbore and Taper Ream Holes.

UNITED STATES SALES REPRESENTATIVES: ARNOLD J. WERNER CO., NEW CENTER BUILDING, DETROIT 2, MICHIGAN



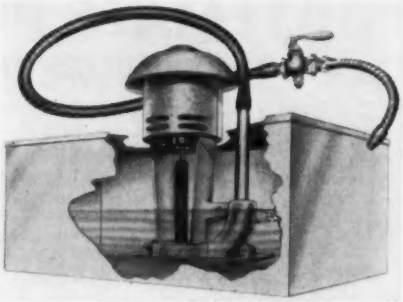
STANDARD MACHINE AND TOOL CO., LTD.
WINDSOR, ONTARIO

For more data circle **562** on Reader Service Card

and similar parts. The head is constructed in male and female sections to meet the specifications of the material to be embossed. According to the manufacturer, the embossing head will provide clear, sharp impressions indefinitely.

For more data circle **107** on Reader Service Card

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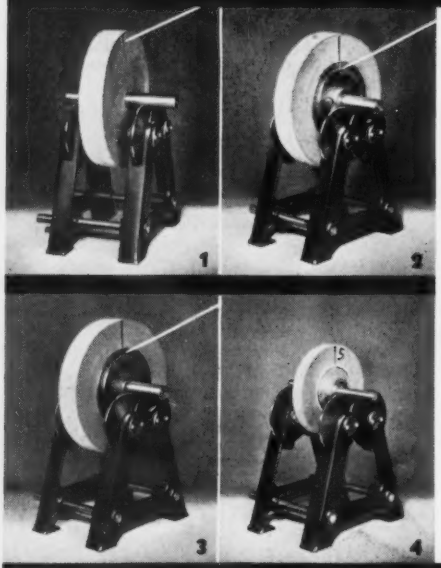


Junior Model "400" Centrifugal Coolant Pump

COOLANT PUMP DELIVERS HIGH VOLUME AT LOW PRESSURES

Designated as the Model "400," a centrifugal coolant pump which is said to be capable of pumping up to 720 gallons of liquid per hour at 0.87 p.s.i. pressure has been announced by Junior Tool Co., 975 W. First St., Azusa, Calif. The unit pumps coolants, cutting oils, water solvents and other light liquids to grinders, mills, upright drills, cut-off machines and other machines requiring coolant in volume. According to the manufacturer, the pump can also be used for liquid abrasive applications, such as glass polishing and grinding.

Completely drip-proof, the Model



QUICK, EASY WAY TO BRING GRINDING, BUFFING, AND POLISHING WHEELS INTO BALANCE . . .

(1) Balance on Anderson super-sensitive Balancing Way and mark light side. (2) Line up mark with both zeros on Anderson Speedi-Balancer. (3) Turn both discs till wheel balances. (4) Record setting. Wheel is now prebalanced for instant use when needed: just use Speedi Balancer, set to number marked, as outside collar. Save time. Eliminate weights. Reduce vibration. Increase motor bearing life. Improve motor performance. For information on sizes, types, and prices of Anderson Balancing Ways and Speedi-Balancers, write for Bulletin 4-22.

ANDERSON BROS. MFG. CO.

ROCKFORD, ILLINOIS

For more data circle **563** on Reader Service Card

DEPENDABLE ACCURACY



INSPECTION TOOLS made of MEEHANITE METAL are designed to fill your various Inspection and Checking needs. Sturdily constructed to give you reliable, accurate service.

Surface Plates — Box Parallels
Slotted Angle Plates
Universal Right Angles
Flat Parallels — Lapping Plates
Toolmaker's Knees — "V" Blocks
Straight Edges (Bridge Type)
Straight Edges (Leveling Type)
Measuring Irons
Masterangle Plates
Angle Attachments

Send for Bulletin

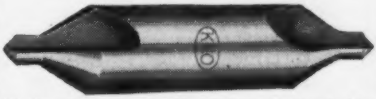
ACME TOOL CO.

73 W. Broadway, New York 7, N. Y.

For more data circle **564** on Reader Service Card

KEO

CENTER DRILLS



Made of finest high speed steel. Available in all standard sizes. Always in stock for *immediate delivery*. Specials made to your specifications.

KEYSEAT CUTTERS





High speed. Right hand ⅛" shank. Diameter from ¼" to 1⅛". Standard sizes in stock for immediate delivery. Complete set —41 sizes—available in sturdy, hardwood box. Saves time and money, because you always have the size you need.



CENTER REAMERS

High speed steel. Reamers from ¼" to 1" regularly furnished with 60°, 82°, 90° included angle. Specials made for your specifications.

LATHE MANDRELS



Precision made of tool steel, hardened and accurately ground. Tapered .0005" to the inch. Mandrels from 8/16" to 1" are .0005" undersize at small end, from 1-1/16" to 3", .001" undersize. Immediate delivery.

Write for Literature

Illustrated literature and prices on all KEO Products mailed on request.

KEO CUTTERS

19326 Woodward - Detroit 3 Mich.

For more data circle **565** on Reader Service Card

400 features all-molded parts (impeller, drip shield, cord insulation and hose) made entirely of heavy-duty Neoprene for long life and maximum service. Stainless steel shielded ball bearings and stainless steel shaft resist rust and corrosion. There are no bearings or seals below the liquid level, and there is said to be no close metal-to-metal contact to cause excessive wear. The pump is available with or without a tank.

For more data circle **108** on Reader Service Card

★ ★ ★

SEMI-STANDARD SPRINGS UTILIZE LIQUID COMPRESSIBILITY

A line of semi-standard Wales Hydra Springs using liquid compressibility has been announced by the Hydra Spring Division of Wales-Strippit Corp., 398 Payne Ave., North Tonawanda, N. Y. The semi-standard springs are the result of shortening the chambers of standard Wales Hydra Springs. In this way, the manufacturer states that a wider range of applications is possible with minimum additional



Wales Semi-Standard Type Hydra Springs



For more data circle **566** on Reader Service Card

HANCHETT

for all metal cutting

Metal Saw Sharpeners



(Hot and Cold Saws)

For Automatic Grinding of Cold Metal Saws.
Rigid — Accurate — Fast.
Ball Bearing Mounted Head Slides.
Heavy Duty Construction Throughout.

For inserted tooth, segmental type, solid tooth circular saws made in three sizes —Models 1130, 1160, 1172.
Saw capacities 8 to 72 inches and larger.
Other Models—Hot and *Cold* Saws, No. 12 and No. 572 (all sizes).

Two Views of High and Low Toothed Metal Cutting Saws

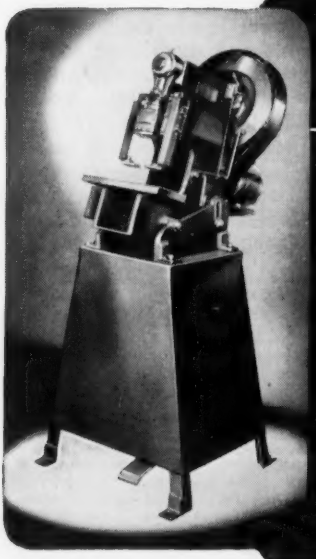
HANCHETT MANUFACTURING COMPANY

COVEL HANCHETT

World's Largest Manufacturers of Shear Blade, Knife and Saw Grinding Machinery

MAIN OFFICE — Big Rapids, Michigan **WEST COAST — Portland 1, Oregon**

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WHITNEY METAL

TOOL COMPANY

42 YEARS EXPERIENCE

WHITNEY-JENSEN
No. 127
INCLINABLE POWER PUNCH PRESS

Small, powerful inclinable punch press that can be tilted to a maximum of 25°. Flywheel at rear permits easier feeding of stock; also provides greater margin of safety. Rated at 275 strokes per minute; length of stroke is 1"; capacity 5 tons. Has non-repeat clutch.

Throat Depth — 6" Throat Height — 7"
Floor Space — 29" x 22"

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WHITNEY METAL TOOL COMPANY
110 FORBES STREET, ROCKFORD, ILL.

For more data circle **568** on Reader Service Card

expense. The high capacity springs are designed to provide maximum force in small spaces due to the compressibility of special fluids (Wales Comproils) used in the springs.

Force and stroke of the springs may be adjusted by changing preloads or volumes or types of Wales Comproils. The springs are said to provide quick, easy installation and simplify product design by being conpact, self-contained, preloaded, and dampened and adjusted in place. The semi-standard springs eliminate drilling, spring pads, mechanical adjustments, external dampening and retainers.

For more data circle **109** on Reader Service Card

★ ★ ★

IMPROVED END MEASURING ROD EQUIPMENT HAS WIDE SADDLE WAYS

Linley Brothers Co., 671 State St. Ext., Bridgeport 1, Conn., has announced improved end measuring rod equipment which is being offered in connection with its jig boring machine. Improvements include the widening of the saddle ways from 5¼ to 7⅜ inches and the addition of a pin-type spindle lock. The equipment consists of two troughs, two permanently mounted 1-inch micrometer heads, two tenths indicators, nine end measuring rods in even inches and the necessary adjusting brackets with adjusting screws. The two 1-inch micrometer heads are attached permanently to one end of each trough. The micrometer heads are of the large-diameter type, having the thimbles graduated in half thousandths and the barrels graduated in



Optional SWIVEL BASE converts a conventional dividing head into a universal work head or rotary table. Change-over is accomplished in seconds without tools or wrenches.

Also available in 10" - 12" sizes and in 10" - 12" spiral drive.

WRITE FOR FOLDER

CARROLL DIVIDING HEAD CO.

3525 Cordiff Ave. • Cincinnati, Ohio

For more data circle **569** on Reader Service Card



You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work *now*—save money too!

IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

HEIMANN MFG., CO. • URBANA, OHIO

For more data circle **570** on Reader Service Card

People work better when they SEE BETTER



MAGNI-FOCUSER

SPEEDS PRODUCTION
With Third Dimensional (3-D) Vision
Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and *prevents squinting*—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

At Superior Tube Co. *— Magni-Focuser helps inspectors check stainless steel capillary tubing.*

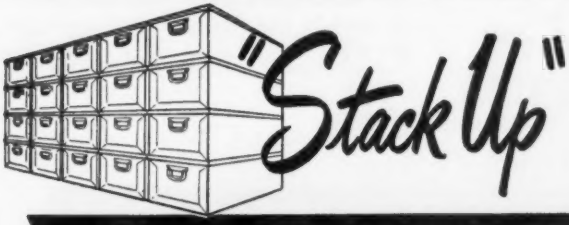
MAGNI-FOCUSER'S
matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

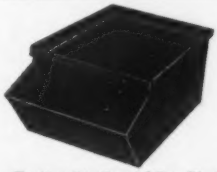
Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. $10.50.

Send for descriptive folder

EDROY PRODUCTS CO. 480 Lexington Ave., Dept. P, New York 17, N. Y.

For more data circle **571** on Reader Service Card





Sterling Bin Front "Top Rim" Steel Stacking Box. Size: 18" x 12" x 6".

THESE BOXES AGAINST ANY!

Once you use and compare Sterling stacking boxes, you'll know why we invite comparision in design, construction, and price. Our "Top Rim" construction provides stronger support all around the box . . . no corner inserts to become loose and fall out. Efficiency in designing and manufacturing allows us to quote favorably on any type or size stacking box.

Write for literature and prices.

Sterling Factory Equipment Co., 183 Charles St., Providence, R. I.



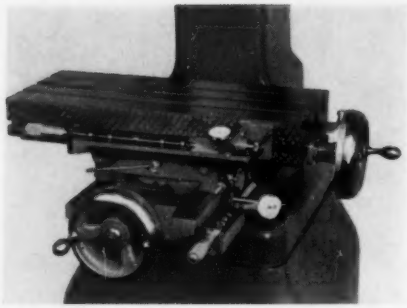
Sterling "Top Rim" Steel Stacking Box with drop handles. Size: 18" x 12" x 6".



For more data circle **572** on Reader Service Card

tenths. Only nine end measuring rods are used, and they are in even inches from 1 to 9 inclusive. The rods are said to be accurate to within 0.00006 inch.

The indicators are of a standard make. The 1¼-inch dials are graduated in 0.0001 inch with 0.008 inch range, so that very accurate settings can be made. All settings are made to the zero only, and the granduations are used only to arrive at the zero. With this setup, the spotting, drilling and rough boring operations are done in the conventional manner by the use of the screws, using the handwheel dial readings. The end measure system is used in the finish boring operation only.



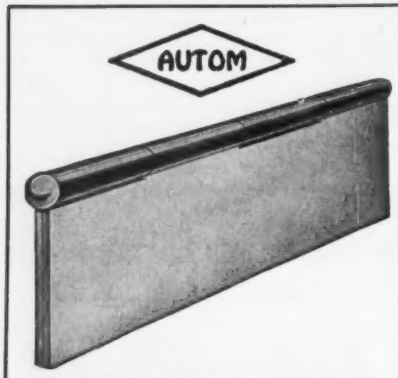
Linley Improved End Measuring Rod Equipment mounted on Linley jig boring machine

For more data circle **110** on Reader Service Card

★ ★ ★

IMPROVED MACHINE GRINDS WIDE VARIETY OF CUTTERS

Union Twist Drill Co., Athol, Mass., has announced the improved No. 3 Tangent-Arc Profile Grinder which



CONTINUOUS HINGES

Manufactured by

AUTO MOULDING & MFG. CO.

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1114 E. 87TH ST. CHICAGO 19

For more data circle **573** on Reader Service Card



SPEEDY and SAFE

CASE HARDENING

WITH NO SPECIAL EQUIPMENT

Indispensable for Machine Shops, Schools, Tool Rooms, Etc.
1 lb., 5 lb., 10 lb., 25 lb., 50 lb., 100 lb. containers.

KASENIT COMPANY

799 GREENWICH STREET BOX G NEW YORK 14, N. Y.

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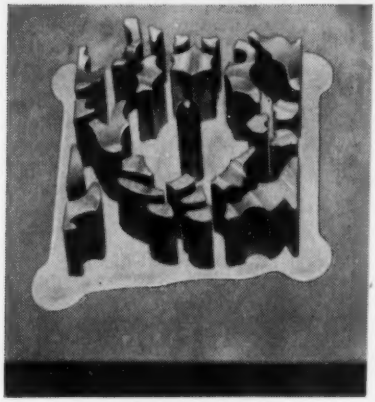


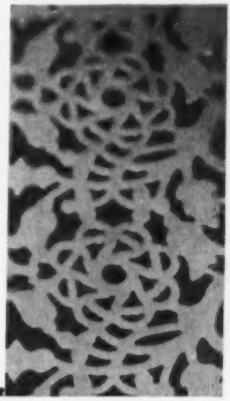
Photo courtesy Stebbins Tool & Die Co.

SKEPTIC BECOMES ENTHUSIAST

ANOTHER skeptical prospect now an enthusiastic customer. *60 hours time saved by using 5 pounds of Cerromatrix* and "The Method" in building this complicated perforating die for .020" thick, half hard brass. Die still in perfect condition after producing over 100,000 pieces.

Die made by Stebbins Tool & Die Co., Bronx, for Embassy Metal Products Co., New York.

Save time with Cerromatrix—write for Booklet—Cerromatrix Method of Punch & Die Setting. And when you buy, insist on *genuine* Cerromatrix. There's a difference.

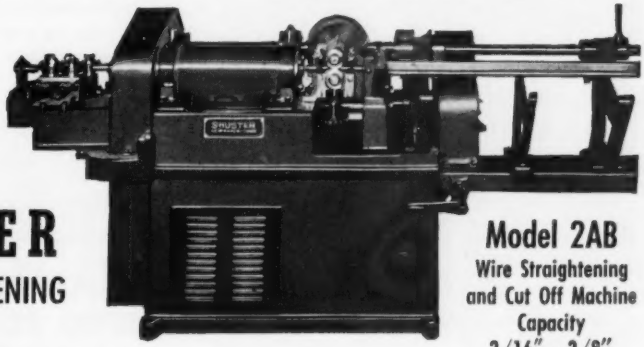


CERRO DE PASCO CORPORATION

Dept. 10, 40 Wall St. New York 5, N. Y.

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ECONOMY MINDED?



SHUSTER
WIRE STRAIGHTENING and CUT-OFF MACHINES

Model 2AB
Wire Straightening and Cut Off Machine
Capacity
3/16" - 3/8"
Basic Wire

• There is a SHUSTER for every wire straightening job from .025 to 11/16" diameter. Over 30 models to select from.

Write today for our recommendation, describing your needs. No obligation whatever.

New York Office: Eleven Broadway, Tel.: WHitehall 4-5480

Mfd. by **METTLER MACHINE TOOL, INC.,** 157 Adeline Street, New Haven, Conn.

For more data circle **576** on Reader Service Card

is designed to reduce set-up time to a minimum. According to the manufacturer, the versatile machine will accurately and efficiently grind a wide variety of cutters, among which are included convex cutters of full half circle up to 2½-inch radius or 120-



Union Improved No. 3 Tangent-Arc Profile Grinder designed to reduce set-up time

degree arc up to a 4-inch radius; concave cutters from 0 to 5-inch radii; arbor cutters up to 10 inches in diameter and 5-inch face; shank cutters (held by shank) up to a maximum size of 10 inches in diameter with No. 11 B & S taper shank and 5 inch length of cut; shank cutters (held by centers) up to 4¾ inches in diameter, 5-inch length of cut and 10-inch overall length of cutter.

The grinder is also said to be



GEARS

In Stock—Immediate Delivery

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send in your blueprints and inquiries.

Send for Complete Catalog No. 20

CHICAGO GEAR WORKS

440-50 N. Oakley Blvd., Chicago 12, Ill.

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Over 85% of the torque wrenches used in industry are

STURTEVANT TORQUE WRENCHES

Read by Sight, Sound or Feel

- Permanently Accurate
- Practically Indestructible
- Faster—Easier to use
- Automatic Release
- All Capacities

in inch grams
...inch ounces
...inch pounds
...foot pounds



Every manufacturer, design and production man should have this valuable data. Sent upon request.

P.A. STURTEVANT CO.
ADDISON (QUALITY) ILLINOIS

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KENNAMETAL
CUTTING TOOLS

- *for Increased Productivity*



KENNAMETAL *Inc.*
LATROBE, PA.

CEMENTED CARBIDE TOOLS, BLANKS, MILLING CUTTERS

For more data circle **579** on Reader Service Card

capable of grinding clearances on straight or spiral teeth at 0 to 90 degrees from the cutter axis, up to 5-inch length of cut. Profiles composed of any combination of circular arcs angles may also be ground.

For more data circle 111 on Reader Service Card

★ ★ ★

DUST EXHAUSTER IS SELF-CONTAINED UNIT

Abrasive Machine Tool Co., 20 Dunellen Rd., East Providence 14, R. I., has announced the Feifel "Dustsnaire," a self-contained dust exhauster for grinders that is designed to remove all particles above five micron grain size of a specific gravity of 1.5 or higher. Based on advanced aerodynamic design principles, the unit does not use a filter, and the only maintenance required is said to be the removal and emptying of a large dust pan located in the base. The dust exhauster is constructed of heavy-gauge sheet metal for long life. The blower is located in the clean air stream to protect it from



Feifel "Dustsnaire" Dust Exhauster Unit



For more data circle 580 on Reader Service Card

wear and abrasion. The unit occupies less than 4 square feet of floor area and is approximately 4 feet high. It is easily portable and can be moved quickly from grinder to grinder.

For more data circle **112** on Reader Service Card

★ ★ ★

ARC WELDER PROVIDES CHOICE OF A.C. OR D.C. WELDING CURRENT

Identified as the "Idealarc," a universal, combination arc welder which provides a choice of either a.c. or d.c. welding current has been announced by The Lincoln Electric Co., Cleveland 17, Ohio. The machine is said to provide an ideal type of welding arc for every type of manual welding application, permitting selection of either a.c. or d.c. and either a soft or forceful arc. The unit is available in several combinations. It can be obtained as an a.c. welder without the d.c. To this unit a d.c. package can be easily attached in about one hour whenever desired. The machine is also available as a combination a.c. and d.c. unit with selection of either current made through a simple twist of a switch handle. Different output capacities of d.c. and a.c. can be combined to fit the machine to the job requirement.



Lincoln "Idealarc" Combination Arc Welder

For a.c. welding jobs, the machine provides a single-phase transformer-type welder, the circuit of which has been designed to give maximum arc stability. The machine is said to produce an unusually smooth spray type of transfer of metal. Both voltage and amperage are controlled to give the desired control of arc characteristics. The Idealarc provides continuous current control through a rotating core in a separate control circuit and also has a switch to permit control of the open circuit voltage. Through this voltage control, the arc can be made to be either a soft arc, steady, low in spatter with a spray-type of metal transfer, or it can be made a forceful digging arc with maximum penetration for crowding the arc without a tendency for electrode sticking.

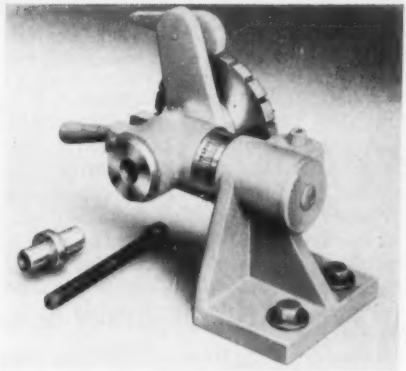
In addition to dual control of the arc, the machine also has an arc booster switch for selecting normal or "hot" starting. The machine's inherent stability is claimed to provide unusually good a.c. starting characteristics, but the switch permits controlling this to give efficient performance on different types of materials, in varying thicknesses and under different joint conditions. It is claimed that the machine will permit using, to their maximum advantage in speed and quality, the new iron powder type electrodes which are designed for best performance with alternating current.

For d.c. welding, the machine provides d.c. welding current through heavy-duty rectifiers. Dual control of

the arc is provided and, in addition, ability to select either normal or "hot" starting with the arc booster. The controls provided, combined with a design and construction that produce an easy steady arc are said to create a d.c. machine with the quiet, efficient operation of rectifier welders with the versatility and operating ease of motor generator welders. Current models available are 300, 400 and 500 ampere a.c. combined with d.c. capacities in 200, 300, 375 and 450 amperes.

For more data circle **113** on Reader Service Card

★ ★ ★



Johnson & Bassett Model MT-1300 Universal Indexing Work Holder for milling machines

INDEXING WORK HOLDER IS SMALL AND LIGHTWEIGHT

Designated as the Model MT-1300, a universal indexing work holder for use on milling machines and pantographs has been announced by Johnson & Bassett, Inc., Production Tool Division, Box 1251, Worcester, Mass. Small and lightweight, the holder will accommodate workpieces up to 6 inches in diameter, of any face width. The work is mounted on a simple fixture

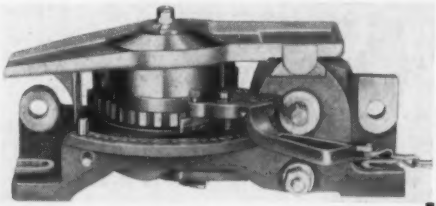
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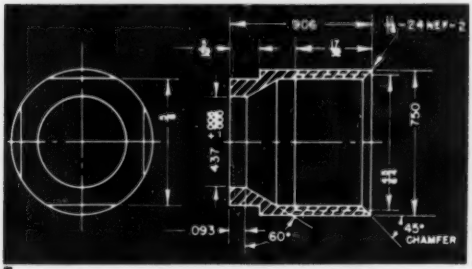
CUT COSTS

ON SECONDARY OPERATIONS WITH THE

DEARBORN

AUTOMATIC CHUCKING AND INDEXING FIXTURE





This piece made from 17 ST Aluminum. It was necessary to straddle mill the four flats as shown. Production was approximately 1000 pieces per hour.

Features:

1. **Work held by collets**
2. **Automatic opening and closing**
3. **Work automatically ejected**
4. **Automatic indexing if required**
5. **Three models with capacities from 1/32" to 2"**

Write for illustrated data. Send blueprints or specifications of work.

J. W. DEARBORN

ANSONIA • CONN.

For more data circle **581** on Reader Service Card

and held by a drawbar through a hollow, heat treated and ground spindle. The spindle itself may be locked in any position, and the graduated swivel joint allows the work to be pivoted and clamped in any position from horizontal to vertical. According to the manufacturer, index plates can be easily changed by removing a single nut and are available with any number up to 60 notches.

For more data circle **114** on Reader Service Card

★ ★ ★

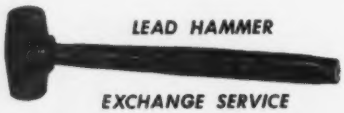
SINGLE-POINT CUTTING TOOL HAS THROWAWAY CARBIDE INSERT

A single-point cutting tool employing a wafer-type, indexable, throw-away carbide insert; adjustable, mechanical chip control; and hardened, replaceable anvil has been announced by The Viking Tool Co., Nichols Rd., Shelton, Conn. The tool features "No-Grind" inserts with either positive or negative rakes. Inserts are indexed to the unused cutting edge after each edge is worn. Negative rake inserts, it is claimed, may be indexed on both sides.



Viking Single-Point Cutting Tool employing wafer-type, indexable, throw away insert

The tool incorporates an adjustable, mechanical chip control block which locks with the top surface of the insert, metal to metal, to eliminate galling or wedging of the chip. A hardened, replaceable anvil is designed to absorb the shock in the event of damage resulting from accidental carbide fracture. The anvil thus protects and lengthens the life of the tool itself, while its close-up support permits the use of thin, inexpensive carbide inserts. The tool can be supplied with



EXCHANGE SERVICE

SAVES MONEY

Purchase initial supply of 3 lb. LEAD HAMMERS at $1.90 each
Exchange the beat up Podlin LEAD HAMMERS for new ones at 95c

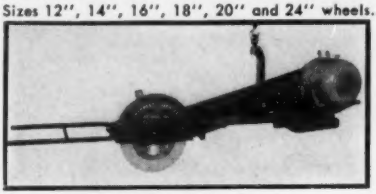
HALF THE PRICE

Handle is formed for comfortable grip, to prevent loosening and to avert slipping from hand. Lead is alloyed and its chemical components accurately controlled for long life hammers. Mass production makes it possible to produce the best LEAD HAMMER at these economical prices.

PODLIN TOOL CO.
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MUMMERT-DIXON SWING FRAME GRINDERS
Sizes 12", 14", 16", 18", 20" and 24" wheels.



Ask for Descriptive Circular
MUMMERT-DIXON CO.
120 Philadelphia St. • Hanover, Pa.

For more data circle **583** on Reader Service Card

triangular and square inserts, style A, B, G, and standard shank sizes Nos. 12, 16, 54, 64, 85 and 86.

For more data circle **115** on Reader Service Card

★ ★ ★

AMPLIFYING COMPARATOR HAS CABLE RELEASE

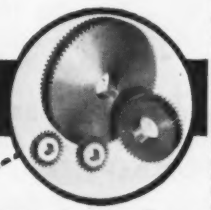
Designated as the "Millimess," an amplifying comparator with a cable release for lifting the contact point by remote control, thus protecting the instrument from the heat of the operator's hand, unequal pressure and vibration, has been announced by George Scherr Co., Inc., 200-MM Lafayette St., New York 12, N. Y. The indicator is a sensitive comparator with an unusually wide range of 0.004 inch and is graduated in 50 millionths of an inch. Clear-cut, sharp graduation lines, each 0.080 inch apart, enable the operator to estimate even finer fractions. Adjustment of the dial hand can be set to zero by means of a knurled thumbscrew on the right bottom of the housing. An extra lift of 3/16 inch over the maximum range is said to permit measuring of grooves and prevent damage of the instrument by insertion of oversize work.

The amplification mechanism con-



"Millimess" Amplifying Comparator

MORRISON 1"
automatic
KEYSEATER





- Cut Keyways — 1/16" to 1".
- Maximum length of cut — 8½".
- Three Feeds, .002", .004", .006"
- Net Wt. 1050#, 1½ HP. Motor.
- Fast, Automatic and Inexpensive.

AUTOMATIC FEEDS



NO BUSHINGS NEEDED

Other features of this machine such as automatic relief of the cutter, automatic stop, quick set-up, single tooth cutters, automatic centering and automatic lubrication make this the finest Keyseater on the market.

Write for Descriptive Literature—
P.O. Box 1017-B

THE D.C.MORRISON CO. CINCINNATI 1, OHIO

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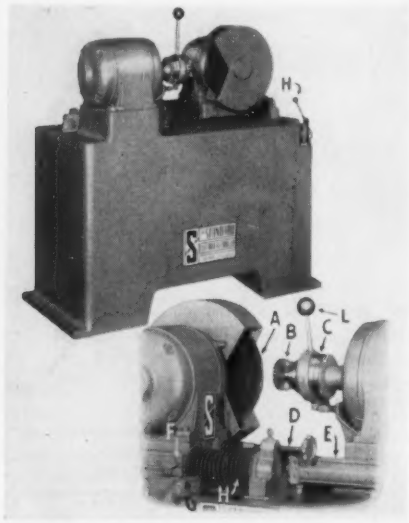
sists of a double lever, gear segment, pinion and hand. There are no knife edge bearings, but measuring pressure is transmitted by means of a precision ball over a highly-lapped plane surface. Between the transmission units there is claimed to be no play or loose fit whatever. Two tolerance hands located outside of the dial can be quickly adjusted to any plus or minus tolerances.

For more data circle **116** on Reader Service Card

★ ★ ★

MACHINE DEBURRS BOTH FACE EDGES OF GEAR OR SPROCKET TEETH

The Standard Electrical Tool Co., 2487 River Rd., Cincinnati 4, Ohio, has developed an automatic-cycle high-production bushing lathe which is designed primarily for deburring both face edges of gear or sprocket teeth simultaneously. The machine utilizes two 12-inch diameter brushes spaced for contact with the opposite radii of the gear. The machine is said to be suitable for work from 3 to 10 inches in diameter.



Standard Automatic-Cycle High-Production Brushing Lathe for deburring operations

Referring to the accompanying illustration, the operator loads the work *B* on chuck mandrel *C* with his right hand; actuates lever *L* with his left hand; moves his right hand from the work area to actuate starting lever *H*. The wheelhead on anti-friction traverse *H* powered by cylinder *E* brings wire brushes *A* into work *B*; *G* actuates timer for dwell; switch *F* controls the motor; and *D* is adjustable traverse stop to compensate for wheel wear.

After the deburring operation is completed, the wheelhead automatically traverses to starting position, with wheel and work motors instantly stopping. Each cycle reverses wire brush rotation for efficient brush life (alternately clockwise and counterclockwise). Both single and double workhead models are available.

For more data circle **117** on Reader Service Card

★ ★ ★

PRECISION GAGES ARE AVAILABLE IN VARIOUS TYPES

S. W. Card Mfg. Co., Division of Union Twist Drill Co., Mansfield, Mass., has added to its line of taps, dies and screw plates a full range of precision gages for fine tolerance work in industries requiring high precision measurements. According to the manufacturer, the gages are particularly recommended for use in such industries as aircraft, automotive, metalworking, electronic, farm equipment, optical, photography, and so on. The gages are available in various types, including reversible thread plug, plain cylindri-

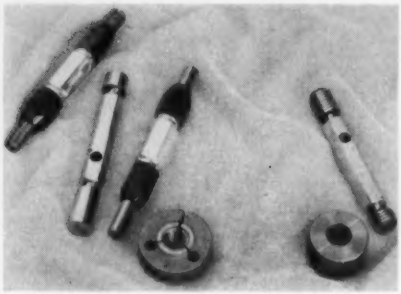


Illustration showing Card Precision Gages

cal plug, reversible wire type plug, taperlock thread plug, thread ring and plain cylindrical ring.

For more data circle **118** on Reader Service Card

★ ★ ★

DIAMOND COMPOUND FOR MICRO FINISHING AND PRECISION LAPPING

Anton Smit & Co., Inc., 333 W. 52nd St., New York, N. Y., announced diamond compound for micro finishing and precision lapping. Scientifically prepared for economy and efficiency in all operations where diamond powder is used, the compound is available in grades for fine finishing of metallographic specimens and optical work; grades for final finishing a wide variety of parts; grades for preparatory finishing of carbides, hardened steel, sapphires, and so on; and grades for fast stock removal, including hogging and ripping operations.

The compound can be supplied in a 5-gram tube or cartridge or in an 18-gram cartridge. Diamond compound guns for accommodating either the 5 or 18-gram cartridges can also be furnished.

For more data circle **119** on Reader Service Card

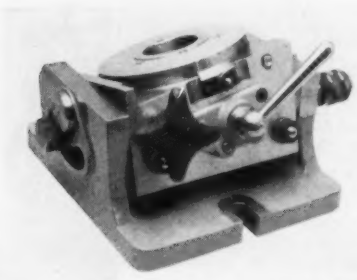
★ ★ ★

MACHINE FLAT-GRINDS AND POLISHES SMALL METAL PARTS RAPIDLY AND ACCURATELY

The Engelberg Huller Co., Inc., 103 Seneca St., Syracuse, N. Y., has announced the Engelberg/Porter-Cable BG-8 Automat Abrasive Belt Grinder which is designed to flat-grind and



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Another WALTER Dividing Head

- **High, Long-lasting Precision.**
- **Horizontal and Vertical Operation.**
- **6 and 3 Minute Readings with Vernier.**
- **Versatility Increased by Various Accessories.**

MODEL ZST **TWO-WAY TILTING**

Also Universal, Semi-Universal and simpler models and precision Rotary Tables in various sizes and executions. Each Tool supplied with Test Report. Max. Permiss. error chart supplied with literature.

SOLE AGENTS

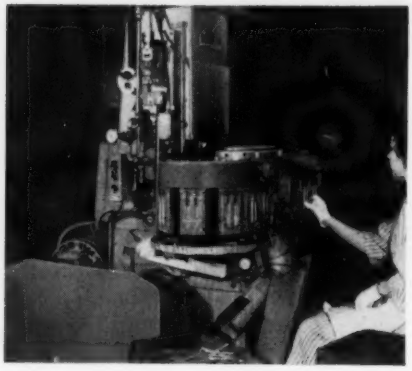
KARL A. NEISE 404 Fourth Avenue Dept. MMS, N. Y. 16, N. Y.

For more data circle **586** on Reader Service Card

polish small metal parts rapidly and accurately.

The grinding machine is equipped with a self-powered, continuous work feed and an 8 x 107-inch abrasive belt. Workpieces are manually loaded but automatically ejected. Ejectors consist of either a positive stop to slide a part off its supporting ledge or a spring claw entering a groove in a pad behind the work. For normal parts, the supporting ledge is shaped as a shallow V-block, with work supported close to the belt.

The feed unit has 21 fixture plates, each measuring 3¾ x 6¼ inches. The number of parts which can be loaded on each fixture plate is limited only by their size. Moved by parallel roller chains, each fixture plate is tracked to the leading edge of the abrasive belt,



Engelberg/Porter-Cable BG-B Automat Abrasive Belt Grinder for flat-grind operations

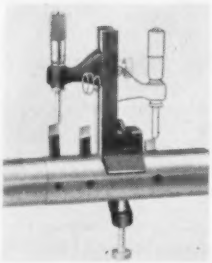
which rides on hardened and ground shoes over hardened and ground steel rails.

As work advances to the belt surface, it is fed slowly across the belt and then is retracted quickly before reaching the far edge of the belt. Feed speeds are variable. Fixture plate rates of travel can be set at 1,090, 1,350 or 1,750 per hour. The coolant system of the machine consists of a 40-gallon tank in the base of the unit, divided into two sediment zones, with a clean-out at one side. Inside the belt housing, a fan-shaped jet sprays the belt. Coolant is also delivered to a spray nozzle above the work area.

For more data circle **120** on Reader Service Card

SAVE TIME

With Bartelt Gages



• Use a Bartelt Pedestal Micrometer for setting boring tools and for many other shop operations requiring accurate positioning relative to a fixed base. Make settings in one step — eliminate cut-and-try-methods. Model B, with reversible slide, shown. *Write for literature describing all models.*

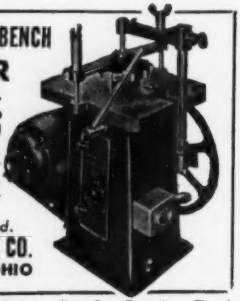
BARTELT ENGINEERING CO.
1216 PARTRIDGE AVE.
BELOIT • WISCONSIN

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READING BENCH KEYSEATER

Portable — move directly to job; a time saver for both small and large shops.
3¾" stroke; adaptable for other work.
Low first cost — prompt delivery.
Good dealers wanted.

READING MACHINE CO.
CINCINNATI 37, OHIO

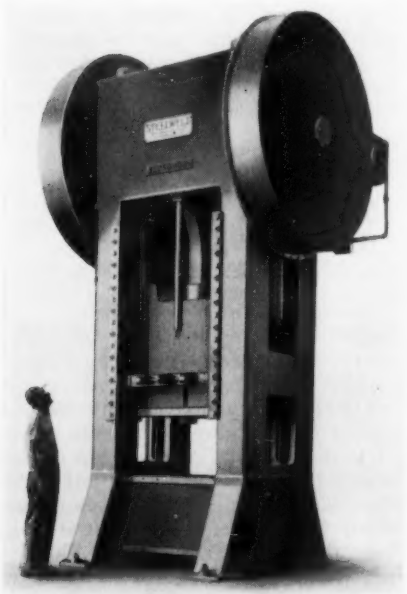


For more data circle **588** on Reader Service Card

TWIN-GEARED SINGLE-POINT PRESS IS MECHANICALLY POWERED

The Cleveland Crane & Engineering Co., 6442 E. 281 St., Wickliffe, Ohio, has introduced a twin-geared Steelweld single-point press of the straight-side tie-rod type. The machine, which is mechanically powered, is of the welded steel construction and is said to incorporate the latest advances in design for safety and dependability. These advances include a low inertia air-operated clutch and brake unit; barrel-type adustment; non-metallic, non-scoring guides; and automatic lubrication. Air cushions are designed with the cylinder opening downward to prevent foreign materials from working in.

The press is available in sizes ranging from 150 to 500 tons, having



Steelweld Twin-Geared Single-Point Press

For Arbor Spacers and Shims, Feeler Stock or Shim Stock...

specify top-quality



ARBOR SPACERS AND SHIMS

20 arbor sizes ¾" to 4" . . . 19 thicknesses .001" to .125" Specify with or without keyways. Also available—hardened and ground spacing collars (with standard keyway) ¼" to 3" long in all popular sizes. (For use in milling, slitting and gang-saw setups, shimming gears and bearings.)

FEELER STOCK



Made from tempered stock, rolled to close tolerances. ½" x 25' coils packaged in transparent plastic boxes, except above .020". Strips ½" x 12", in cellophane. 27 thicknesses. All thicknesses from .001" to .032". (For use in precision fitting, checking clearances, inspection and production work.)



SHIM STOCK

Selected from material rolled to precision limits, free from burrs, and protected by oil coating. Coils packed in carton for easy dispensing and protection. 15 thicknesses .001" to .032". Sheets 6" x 12"; coils 6" x 120". Available also in assortment package of 12 thicknesses .001" to .015".

For details and prices, write for descriptive literature.

DE-STA-CO



Detroit Stamping Co.

349 MIDLAND AVE. • DETROIT 3, MICH.

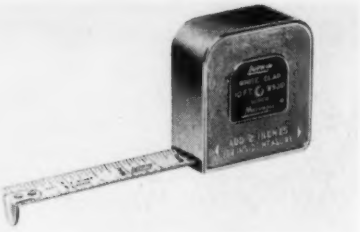
For more data circle 589 on Reader Service Card

bolster areas of from 30 x 36 inches to 42 x 48 inches. Operating speeds are from 10 to 20 strokes per minute.
For more data circle **121** on Reader Service Card

★ ★ ★

HEAVY-DUTY TAPE RULE HAS ¾-INCH WIDE LINE

Designated as the "Super Mezurall," a heavy-duty tape rule with a ¾-inch wide line has been announced by The Lufkin Rule Co., Saginaw, Mich. The tape rule is available with either the popular "White Clad" blade or the extra durable "Chrome Clad" blade. Designed especially for builders, carpenters and other professional craftsmen, it features a magnesium alloy case which is light, yet durable. The tape is marked in both feet and inches and in consecutive inches to 16ths, with the first 12 inches graduated to 32nds. The rule also features a heavy black diamond every 16 inches to indicate the location of studding, and so on, on 16-inch centers. The self-adjusting end hook is long and wide and adjusts for accurate hook-over or butt-end measurement. The wide blade is flexible, but the extra width permits it to extend a long distance without buckling. The rule is available in both 10 and 12-foot lengths and the blade can be quickly and easily replaced if damaged.



Lufkin "Super Mezurall" Heavy-Duty Tape Rule

For more data circle **122** on Reader Service Card

★ ★ ★

TOOLHOLDER FEATURES "THROW-AWAY" CARBIDE INSERTS

Designated as the "Multicut," a toolholder for medium-duty machining operations and featuring "throw-away" carbide inserts which eliminate grinding has been announced by Wesson Co., 1220 Woodward Heights Blvd., Detroit 20, Mich. Positive chip control is said to be provided by an adjustable carbide-tipped chip breaker clamp serrated in steps of 0.040 inch starting from 0.050 to 0.060 inch from the cutting edge. The range of adjustments is ⅛ inch on smaller inserts to 5/32 and 3/16 inch on the larger inserts.

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LIVE CENTER



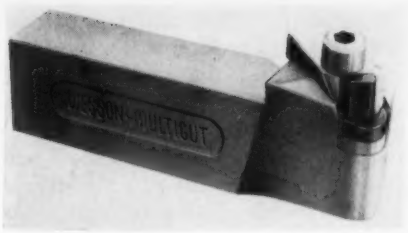
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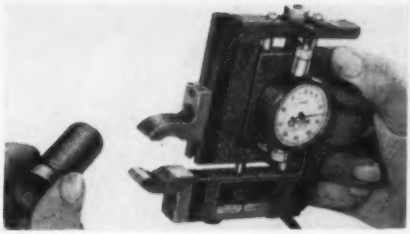
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Wesson "Multicut" Toolholder with insert



Standard "Versa-Dial" Dial Gage in use

According to the manufacturer, rapid one-adjustment insert indexing or changing is possible from either top or bottom since the locking screw contains hex sockets on both ends.

Other important design features include interchangeability of replacement parts with standard or special holders of the same style; low cost one-piece anvil-locator plate construction relieved to clear built-up edge, assuring positive insert location; and use of specially treated steel on the anvil-locator plate to overcome the critical problem of "feather edges," especially on the end cutting angles.

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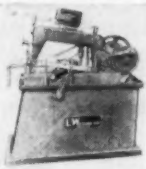
GAGE CHECKS INTERNAL OR EXTERNAL THREADS

Identified as the "Versa-Dial," a multi-purpose dial gage which is said to be useful for the checking of internal or external threads, grooves, shallow counterbores, narrow shoulders, and so on, has been announced by Standard Gage Co., Inc., Poughkeepsie, New York.

Interchangeable segments for contacting the work surfaces to be measured are secured in T-slots at desired spacing. The user may select segments from a variety of stock types, or, in the case of unusual jobs, have special ones made. Large dimensions can be checked through the use of larger T-slots or, for even greater dimensions, by trussed extensions.

The gage may be equipped with an indicator having either 0.001, 0.0005 or 0.0001-inch graduations. Movement of the slideable U-section of the gage is said to actuate the indicator directly without intermediate linkages. Sliding action of the movable section is claimed by the manufacturer to be unusually smooth.

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Electrical Discharge Machining Film

A revolutionary concept in the field of metalworking, electrical discharge machining is an animated sequence in a color motion picture produced by Elox Corporation. Electrons, atoms, charged vapors and other phenomona are illustrated by an art style which differs greatly from standard mechanical animation sequences. To show actual cuts in progress, Elox engineers set up jobs so that they could be disassembled to give the camera a cross-sectional view. A portion of the cut was made under normal conditions, then the coolant was drained from the tank, the two section workpiece was split and an exposure was made. The tank was then filled, another portion of the cut was made and then draining and disassembling was repeated. A bottom cavity cut and a grinding operation are shown by the same technique.

Near the end of the film, which runs under 20 minutes, examples of jobs done by Elox Electrical Discharge Machining are shown in full screen close-ups. In some cases, magnification on a 6-foot wide screen will be as much as 150 times. The pictures show clearly the unusually fine finish the process produces. The scenes are accompanied by a narrative which, technically accurate, can be easily understood by the layman. Showings of the film to interested groups can be arranged by contacting the Elox Corp., 740 N. Rochester Rd., Clawson, Michigan.

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Plant Modernization Film

Entitled "A Way of Thinking," a print of a 15-minute film is available on a free loan basis to those interested in plant modernization by writing to the Cincinnati Lathe & Tool Co., 3260 Disney, Cincinnati 9, Ohio. The film is a 16-mm., full color, sound motion picture in which a business paper reporter tells the story of plant modernization and how to combat obsolescence in order to maintain an adequate defense base and competitive position.

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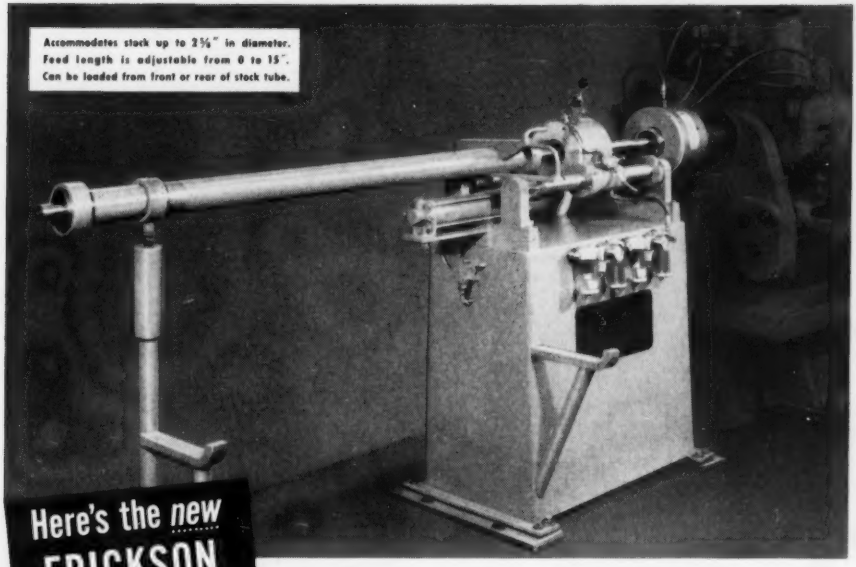
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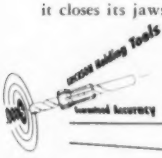
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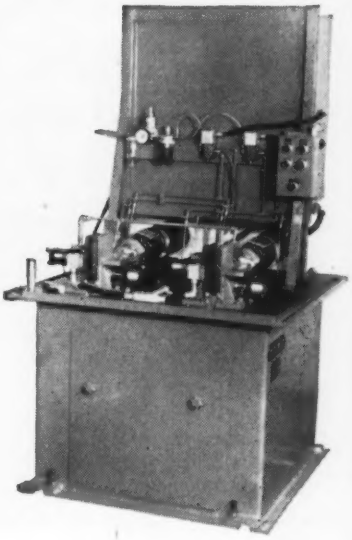
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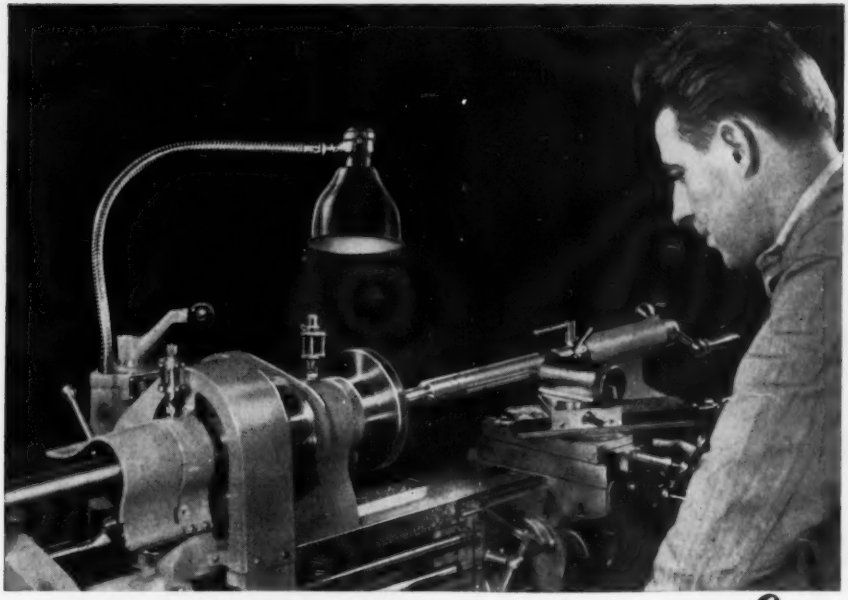
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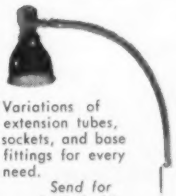
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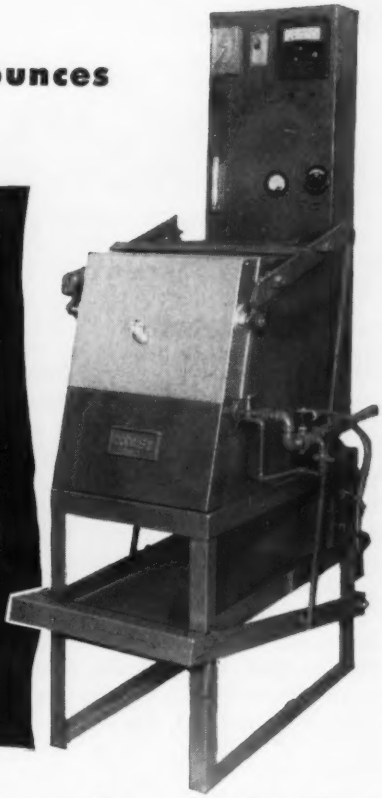
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the last word

By Fred W. Vogel, *Editor*

ON THE SIDELINES

Most manufacturers, aside from the relatively few who are engaged in the manufacture of military equipment, must be content to watch any progress in the use of the relatively new material titanium from a vantage point on the sidelines. With the actual use of all of the metal being produced being allocated in the ratio of 90 percent for military use and a mere ten percent to civilian use we realize that it is difficult to stir up much enthusiasm for a discussion of titanium. And yet, the day may not be far off when a greater supply, a lower price, or unlimited civilian use will make titanium more readily available for the multitude of civilian products in which it can be used.

It was largely out of curiosity and also a desire to see at first hand the newest process of producing titanium that your editor last month visited the new facilities of Mallory-Sharon Titanium Corporation, Niles, Ohio. Here we witnessed the operation of a double melting facility which produces molten titanium in a vacuum using consumable electrodes. The electrodes are formed from sponge titanium which is compressed into relatively short sections in a 3000 ton Hydraulic Press Mfg. Co. press, and then these short sections are welded together to form an electrode of the desired length.

As with every type of metal, especially those which offer as much promise as titanium, research goes on at a relentless pace to find the best method of producing the metal. Mallory-Sharon executives told us that it costs many hundreds of thousands of dollars to put a new alloy on the market, to develop a new method of production, or to develop specifications that will give a higher degree of quality to existing products. M-S is now on its fourth set of production melting furnaces since 1951. Each type of melting has been an improvement over the method used before and each has been developed as a result of a tremendous amount of planned research and experimentation. They have changed from the induction melting in a graphite crucible to the arc melting with a non-consumable electrode to the consumable electrode melting to the new Method "S" involving vacuum melting.

The rapidly expanding consumption of titanium for military purposes can best be illustrated by cit-

ing an example of one airframe manufacturer's experience with the metal. Only three years ago this particular company produced the first production jet fighter that included titanium parts. The total weight of the parts amounted to only 85 pounds. A few of these parts were highly stressed members, but most were of little structural importance and all parts included a sizable built-in safety factor. Today, this same airframe company is producing a supersonic jet fighter with a complete aft fuselage fabricated from commercially pure and alloy titanium. The total net part weight exceeds 700 pounds.

Titanium fasteners on future aircraft will save many pounds of weight. It has been estimated that if steel bolts were replaced with titanium on one commercial aircraft a savings of 1,000 pounds could be obtained. Titanium is being utilized in the construction of a commercial airplane for the first time in the new Douglas DC-7. Edward F. Burton, Chief Engineer of Douglas states that approximately 88 percent of the skin on the new DC-7 engine nacelles consists of titanium sheet.

Military usage of titanium is not restricted solely to the aircraft industry. Army equipment such as tank parts, field gun outriggers, armor plate, and various types of portable equipment are utilizing the lightweight and corrosion resistance of titanium ideally. Ordnance mortar base plates made from titanium are enough lighter than their steel counterparts that only one man instead of two is required to carry a single plate.

Applications in ship building, in the chemical industry for acid tanks, condenser and heat exchanger tubes, steam turbine blades, and in the food processing industry some day will consume considerable tonnages of titanium. If the progress made in the next five years is equivalent to that made in the past two years Mallory-Sharon engineers expect the following materials to be at least ready for production evaluation by the users of titanium:

One — Sheet alloys which can be formed in a soft condition and aged to strengths of 200,000 PSI with a saving in weight over stainless steel of about 30 per cent.

Two — Forging alloys which will compete with high heat treat steel at 280,000 PSI ultimate (at room temperature) with a saving of 40 per cent in weight.

Three — High temperature alloys which will have the required creep characteristics at 800 deg. F. and possibly at 1000 deg F. It is possible that oxidation resistance rather than creep strength will become the limiting factor in the use of these alloys at this point.

Putting together the information gathered from a visit to Mallory-Sharon makes one more keenly aware of the importance of research in any program of new development today. Research men working with titanium realize that they are only at the beginning and that an amazing future lies before them.

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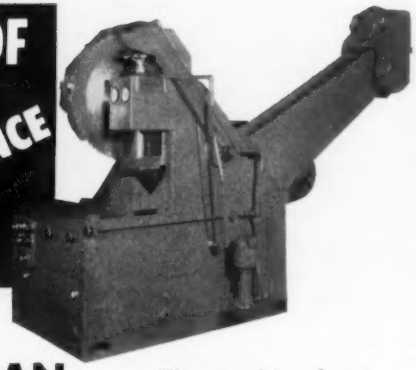
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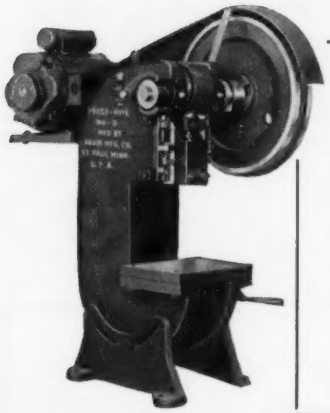
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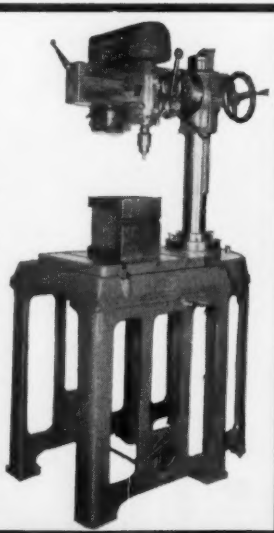
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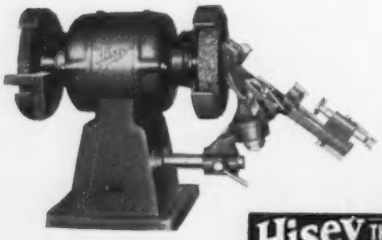
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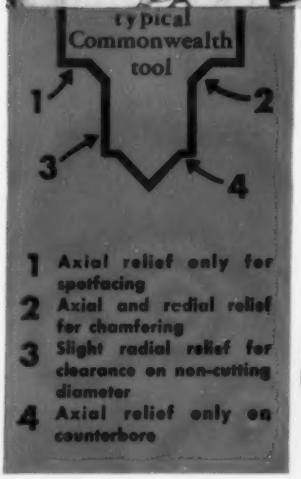
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